DOCUMENT RESUME

ED 227 989 RC 013 944

AUTHOR	Conry, Robert F.; And Others
TITLE	An Evaluation of Project Learning Tree in British Columbia. Appendices.
INSTITUTION	British Columbia Univ., Vancouver. Faculty of Education.
SPONS AGENCY	Weyerhauser Company Foundation, Tacoma, WA.
PUB DATE	[82]
NOTE	215p.; For related document, see RC 013 943.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC09 Plus Postage.
DESCRIPTORS	*Affective Measures; *Cognitive Measurement; Elementary Education; *Environmental Education; Extracurricular Activities; Field Trips; Foreign Countries; Forestry; Lesson Plans; Program Evaluation; Questionnaires; Student Projects; Teacher Response; Teaching Guides; Tests; *Trees
IDENTIFIERS	British Columbia; *Project Learning Tree BC

ABSTRACT

The volume contains seven appendices (A-G) which accompany the first volume. Appendix A provides a list of project personnel and of teachers who participated in the unit development workshop. Appendix B, composed of six sections, includes the unit lesson plans and teachers' guides used in the field study for grades 3, 5, and 7. The grade materials may be quickly located by the title pages which introduce them. Appendix C contains the cognitive and affective instruments designed for pre- and post-instructional use. Appendices D and E offer samples of student activities used during field execution of the project. Appendix D consists of materials related to a field trip to the University of British Columbia Research Forest. Appendix E contains student art work and compositions produced in a grade 3 classroom. Appendix F provides a copy of the teacher evaluation form which solicited teachers' reactions to the units. Appendix G is the Phase I evaluation report which describes procedures and findings of the initial survey which examined Project Learning Tree usage patterns in British Columbia classrooms and considered the feasibility of a field evaluation. (Author/NQA)

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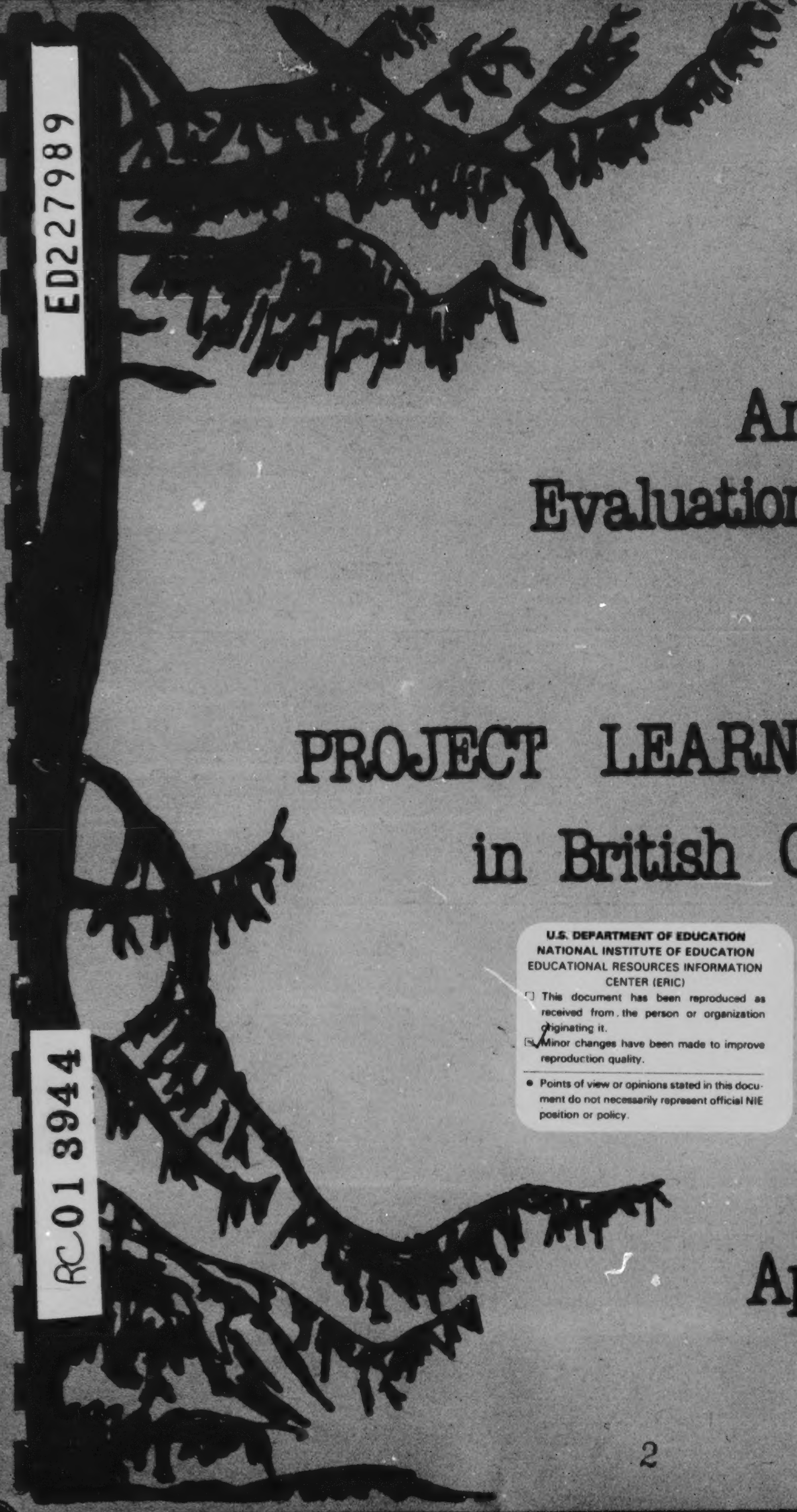

An Evaluation of PROJECT LEARNING TREE in British Columbia

Appendices

[1982]

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RC013944

Volume II of the Final Report: Evaluation of Project Learning Tree in British Columbia contains the Appendices A through G, which accompany Volume I:

Appendix A provides a list of project personnel, and of teachers who participated in the unit development workshop.

Appendix B is composed of six sections: for each of grades 3, 5 and 7, the unit lesson plans and teachers' guides used in the field study are included. The grade 3 materials may be quickly located by the yellow title pages which introduce them; the grade 5 materials by beige title pages, and the grade 7 by green.

Appendix C contains the cognitive and affective instruments designed for pre and post instructional use.

Appendices D and E offer samples of student activities during field execution of the project: Appendix D consists of materials related to a field trip to the University of British Columbia Research Forest, while Appendix E contains student art work and compositions produced in a grade 3 classroom.

Appendix F provides a copy of the Teacher Evaluation form which solicited teachers' reactions to the units.

Appendix G is the Phase I evaluation report which describes procedures and findings of the initial survey which examined Project Learning Tree usage patterns in British Columbia classrooms and considered the feasibility of a field evaluation.

APPENDIX A

Unit Development Teams

Unit Development Teams, Project Learning Tree Evaluation:

Project Director: Robert Conry, University of British Columbia
Research Associate: Sharon Jeroski, University of British Columbia
Research Assistant: Margaret McLaren, University of British Columbia

Consultants: Melissa Hadley, Canadian Forestry Association
Barbara Jones, Canadian Forestry Association
David Bateson, University of British Columbia
Joyce Matheson, University of British Columbia

Participating Teachers:

Jill Ashton-Leigh	Delta
Mauri Clemons	Richmond
John Fulton	Coquitlam
Laurna Harrington	Abbotsford
Marie Hewitt	Nanaimo
Mary Isaacson	Nanaimo
Mel McMechan	West Vancouver
Carol Marsel	Princeton
Brenda Meeker	Campbell River
Bob Smith	North Vancouver

APPENDIX B

Instructional Units and Teachers' Guides

TEACHER'S GUIDE
AND
INSTRUCTIONAL UNIT

PROJECT LEARNING TREE FIELD EVALUATION
British Columbia, 1980

Grade Three

TREES PLEASE!

Developed by:

Jil Ashton-Leigh - Delta
John Fulton - Coquitlam
Marie Hewitt - Nanaimo
Carol Marsel - Princeton

TEACHERS' GUIDE

-FOREWORD-

These lessons are designed to be taught over a period of six weeks with two forty minute lessons per week. There will undoubtedly be many spin off lessons that could develop involving Language Arts, Social Studies, Art, Health, etc. Allowing follow-up time for these lessons will reinforce the skills and provide greater student interest and participation in the learning of these skills.

To do these lessons teachers do not need a knowledge of the outdoors. Lumberjack clothing and hob-nailed boots are not necessary. Where outside activities are involved teachers and students should dress comfortably.

Lesson 1

The "Touchy-Feely" Box

HELPFUL HINTS AND SUGGESTIONS

- students work in groups of 3 or 4.
- all items for each "touchy-feely" box should come from the same type of tree (e.g. only coniferous parts in one box).
- half of the boxes could have coniferous tree parts; the other half - deciduous.
- containers should be fairly large and contain quite a few items in order to facilitate the next lesson.

SUPPLEMENT

- other possible Lessons found in PLT which relate to this Lesson are:

#6 Leaf Hunt relay (3-6)
#9 Leaf prints (K-4)
#16 Signs of fall (K-3)
#26 Invent-a-game (K-6)
#29 Colours from nature (K-6)
#67 Large leaves (K-3)
#85 Make a fossil (K-3)

MATERIALS NEEDED

- containers
- items for container (branches, twigs, roots, leaves, needles, cones, seed).

Lesson 2

Tree Assembly
(An extension of PLT 11)

HELPFUL HINTS AND SUGGESTIONS

- the teacher may wish to begin by drawing or having the students draw a tree trunk on the paper for each group.

SUPPLEMENT

- other possible Lessons found in PLT which relate to this Lesson

(see those listed for Lesson 1 "Touchy-Feely" Box).

MATERIALS NEEDED

- items from "touchy-feely" box (e.g. branches, twigs, roots, leaves, needles, pine cones, seeds).
- chart paper, construction paper or heavy cardboard (strong paper is required).
- glue (must be strong enough to hold tree parts on paper; rubber cement works well).
- felt pens or crayons.

Adopt a Tree

HELPFUL HINTS AND SUGGESTIONS

- children may need to discuss the meaning of "adopt"
- if there are many trees set boundaries for your students
- take a whistle outside with you
- surveyor tape and felt pen could be used for marking students' trees (good only for an area where there are few tape collectors)
- this lesson could take longer than 40 minutes. Teachers may wish to adjust timetable accordingly

SUPPLEMENT

- other possible lessons found in PLT which relate to this lesson are:

  #50 - A Tree From an Acorn Grows (K-3)
  #59 - Bursting Buds (K-3)

MATERIALS NEEDED

- if no tree is available, a potted shrub or small tree may be used.

Lesson 4

How Big is Your Tree

HELPFUL HINTS AND SUGGESTIONS

- a review of metric measurement using cm and m would make this lesson go more smoothly
- a review of "what is the meaning of circumference"
- discuss, demonstrate how to measure using a piece of string -- students could practice in the classroom, measuring their wrists, necks, ankles, or waists
- have several items available for the students to measure

SUPPLEMENT

- other possible lessons in PLT which relate to this lesson are:

#60 - Math Exercise	(K-3)
#51 - Growth Graph	(K-6)

MATERIALS NEEDED

- meter stick
- sewing tape
- metric tapes
- string -- enough for each student to have a piece long enough to go around the biggest tree

Lesson 5

Sherlock Hemlock: Getting to Know Your Tree

HELPFUL HINTS AND SUGGESTIONS

- a questionnaire could be designed for the children to fill out: for example: "My tree is ______ years old; its neighbours are ______," etc.
- in the classroom or outside, students can practice describing objects to other students who then guess what was described.
- send a child out of class, then have other students describe what that child was wearing, colour of hair, etc. "Spring" this on the class, so that they do not see the student leaving the classroom.
- place a number of objects on a table, have students quickly observe the objects, then cover objects up; students describe objects.
- students can look for 'other' life and 'neighbours' in their classroom (e.g. flys at the window, spiders in corners).

SUPPLEMENT

- other lessons found in PLT which relate to this lesson are:

#50	A Tree From an Acorn Grows	(K-3)
#59	Bursting Buds	(K-3)
#14	Living Labels	(K-4)

MATERIALS NEEDED

- magnifying glass, or a cardboard facsimile with a hole cut to focus student's attention.

Tree Cookies

HELPFUL HINTS AND SUGGESTIONS

- have a variety of tree cookies, sized so that children can compare/contrast them.
- if possible obtain tree cookies from different kinds of trees -- compare them (e.g. cedar, fir, pine)
    - smell
    - width of growth rings
    - bark
- tree cookies can be cut into cookie puzzles -- children can put them together (colour code puzzles in case pieces become mixed up). These puzzles allow students to consider grain of the wood.

MATERIALS NEEDED

- enough tree cookies for your class (1 per child).
- tree cookies built out of plasticine with two different colours for alternating rings are good "explainers" showing students what happens as a tree grows and where the new layers appear (at the outside of the tree).

Lesson 7

PLT
17

Plant Personification

HELPFUL HINTS AND SUGGESTIONS

- this lesson may take considerably less than 40 minutes.
- review large and small muscle movements to help children feel more familiar with creative movement.
- a nice book to share with your class (which relates to this lesson) is

  The Giving Tree - Shel Silverstein
- to initiate this activity have students act out the life cycle of a tree.
- lights in gym, or area being used, could be dimmed, making students feel more at ease.

SUPPLEMENT

- other possible lessons found in PLT which relate to this lesson are:

  # 2 - Sounds in City and Forest (K-6)
  #12 - Sounds Around (K-4)
  #28 - Natural Art (K-4)
  #43 - Musing on Music (K-6)
  #47 - Long Range - Short Range (K-3)

MATERIALS NEEDED

- record or tape of music
- tamborine or drum

Lesson 8

Tree Shapes - Natural and Unnatural

PLT
9
and
10

HELPFUL HINTS AND SUGGESTIONS

- rather than use a flannel board you might try sticking magnetic tape on the back of the geometric shapes, then placing on magnetic blackboard -- students could use chalk to expand, add to the shapes.
- teacher could give only 1 geometric shape to each student and student must find a tree of that shape.
- sponge paintings are a good follow-up activity.

SUPPLEMENT

- other possible lessons found in PLT which relate to this lesson

# 8 - Patterns in Nature	(K-6)
#15 - Branching Out	(5-6)

MATERIALS NEEDED

- flannel pieces
- flannel board
- construction paper
- scissors, glue, rulers
- magnetic tape

Lesson 9

Build Your Favorite Tree
(An extension of Lesson 8)

HELPFUL HINTS AND SUGGESTIONS

- place a piece of cardboard on student's desk to act as a working area. This can be moved easily and keeps the desk area clean.
- keep your custodian happy -- keep the plasticine off the wall.
- welding of parts (e.g. branch to the trunk) may have to be discussed and demonstrated. Also a toothpick can be stuck inside plasticine for added support.
- may have to add baby oil to the plasticine to make it more pliable.
- students may write stories about their trees or about why they chose a particular tree.

SUPPLEMENT

- other possible lessons found in PLT which relate to this lesson are:

  #8 - Patterns in Nature (K-6)

MATERIALS NEEDED

- plasticine or play dough
- straws
- toothpicks
- coloured sticks
- scissors
- cardboard (to build on)
- string

Lesson 10

Expanding Sensory Perception

PLT
7

HELPFUL HINTS AND SUGGESTIONS

- this activity requires close teacher supervision.
- a review of the five senses.
- a review of descriptive words.
- a review of living and non-living things will help children focus on this.
- a nice book to share with the class (for an extension)

  The Listening Walk - P. Showers

MATERIALS NEEDED

- blindfolds--old scarves may be used--bibs, pinnies from gym equipment.
- blocks of aromatic wood.

(blindfolds that are easy to construct and are "peek-proof" are cotton batting balls that are taped over each eye. Magic tape doesn't rip skin off).

Long Range - Short Range

HELPFUL HINTS AND SUGGESTIONS

- this lesson will probably take longer than 40 minutes.
- students could be divided into smaller groups--a time limit given to reach a group decision--students called back to larger groups--a spokesperson from each group tells the rest of the class their group's decision.

SUPPLEMENT

- Tree House E-360
  HRW, 1969, 9 min, colour
  (see p.4 B.C. Bibliography for PLT)
- Secret Places - D.J. Arneson
  Holt, Rinehart and Winston. In New York
  1971 E K-3
  (see p.3 B.C. Bibliography for PLT)
- this activity can lead very naturally into the construction of conservation posters.

Lesson 12

How to Keep a Tree Happy Discussion
(Adaptation of PLT 86)

PLT
86

HELPFUL HINTS AND SUGGESTIONS

- an alternative to a class book would be a class mural
- this book could be kept in the class to be referred to later. At the end of the year, the book could be catalogued and kept in the library
- students could make an individual book or a poster
- crossword puzzle, a maze for the woodpecker to find the bug/bird to nest/
- poem about a tree
- glue natural twigs, tree seeds, etc. in a tree shape
- a collage using twigs, pine cones, etc.

MATERIALS NEEDED

- paper
- construction paper
- felt pens, crayons, paints
- stapler

Lesson 1

The "Touchy-Feely" Box

PLT

11

SUBJECTS
Language Arts and Humanities
Science

GRADES
K-6

PLT PRINCIPLES
1. Environmental Awareness
3. Cultural Contexts
2. Diversity of Forest Roles

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
3.42 Environmental Perspectives
2.112 Forest as Resource Pool

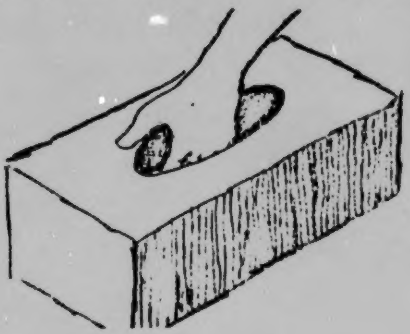
SKILL
I. Gaining Information

OBJECTIVE

Students will be able to identify parts of a tree using only tactile perceptions.

ACTIVITY

Make several covered containers (a large ice cream container, hatbox, or even a shoe box will do). Cover and decorate the box, making a round hole so that students can reach into the box easily. For example:



The teacher should fill the box using identifiable tree parts such as

- branches, twigs
- roots
- leaves, needles
- cones (pine, fir, cedar, etc.), seeds (maple wings)

from either a coniferous tree or a deciduous tree.

Students, working in their own groups, reach into the box and using their tactile sense determine what part of a tree is being touched. After each child in the group has felt what is in the box, it is opened and the items are displayed and discussed. Pose questions such as: Does each group have the same items? (compare) Are all parts from the same type of tree? Considerable teacher direction may be necessary.

Establish a simple scheme for classifying objects in the box by the way they feel; for example, rough, hairy, soft, smooth.

EXTENSIONS

1. Each student can make a "Touchy-Feely" Box of his or her own, filling it with three or more interesting and different examples of living and nonliving things. Once completed, all of the boxes can be displayed in the classroom in such a way that the students can take turns reaching into each of the boxes to try to determine what is inside. Older students can write down their guesses on a sheet of paper by each box. Again, be sure students do no harm to their environment by gathering things to put in their box. For safety's sake -- the animal's as well as the students' -- prohibit any student's putting a live animal in a box.

2. In order to share their learnings, the students can make bulletin boards or displays from the contents of the "Touchy-Feely" Boxes they make. Two classrooms of students could also exchange boxes.

3. A "Touchy-Feely" box could become a regular item in classroom and added to daily as a news item or used in a science centre. -- What do you think you will find in our box today?

Lesson 2

Tree Assembly - extension of Lesson 1

PLT

SUBJECTS
Language Art
Health, Art,
Science

GRADES
K-6

OBJECTIVE

To increase students' awareness of the parts of a tree and their relative locations.

ACTIVITY

The groups of students take their same "touchy-feely" boxes used in previous lesson, take items from box, discuss and decide what the item is and where on the tree it belongs. Glue items on a large piece of cardboard, construction paper or bulletin board. Continue until all parts are placed. Students may then draw or color extra branches, bark, roots, needles, leaves.

EXTENSION

(1) Discussion may take place comparing each other's trees.

(2) Compare tree parts to human body parts.

(3) Compare tree parts and their functions to human body parts and their functions (refer to page 5 PLT - sample statements).

Adopt-A-Tree

1

OBJECTIVE

Students will be able to list the basic characteristics of a tree as determined by their own observations.

ACTIVITY

This activity may be conducted as a class project; with a class divided into groups of three or four students each; or with students working individually. Several related activities are included in the pages that follow. They are indicated by Adopt-A-Tree in the titles.

This activity begins with adopting a tree (or trees) near or on your school site. If there are no trees nearby you might bring a potted tree to your classroom or try to have a tree planted on the school grounds. "Adopting-a-tree" is a valuable way to initiate a unit of study on trees with any age group.

The first visit

Visit the adopted tree(s). Give it a name, (Isabel, Dave, etc.)
Describe the tree as it is right now, today.
Look at its physical characteristics (size, leaf shape, bark color, and other features).
Look to see whether it is alive. How can you tell?
Look to see whether it appears to be asleep (dormant) or awake. How can you tell?
Listen to find out whether it makes any sounds.
Smell to find out whether it has an odor. Do different parts of the tree smell different — like bark, old leaves, new leaves? Think about whether the tree and its parts might smell different to you at other times of the year.
Think about how the tree got where it is and how new trees might come to join it.
Think about what other living things might need this tree for survival.
Think about what things the tree might need for its own survival.
Think about how long the tree might live.

Warning: Do not taste any part of the tree.

SUBJECTS
Language Arts and Humanities
Science

GRADES
K-6

PLT PRINCIPLES
1. Environmental Awareness
2. Diversity of Forest Roles
3. Cultural Contexts
6. Life-Support Systems
7. Lifestyles

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
2.112 Forest as Resource Pool
3.42 Environmental Perspectives
6.2 Constancy of Biological Change
7.4 Creative Expression and the Environment

SKILLS
I. Gaining Information
II. Communication

1

(Continued)

After the first or more visits

Once back in the classroom and now that you and your students have adopted a tree, you might ask your students to tell you what they think a tree is. Accept all statements offered and be careful to record the students' exact words and phrases. List the statements on the chalkboard; discuss and make any changes suggested. When statements have been agreed upon, you and the students can put them together in the form of a poster, chart, or bulletin board.

Here are some sample statements:

A tree is a living thing.
A tree has many parts, just as people have many parts to their bodies.
There is the trunk (main torso), bark (skin), branches (arms, legs), leaves or needles (hair).
Trees have names. [The children can mention some names of trees.]
A tree has many uses. [You and the students may wish to list some.]
A tree interacts with and is dependent upon many other organisms, such as insects, mammals, and birds.

These initial activities can help you decide on follow-up projects by indicating what the students already know, what their interests are, and the kinds of additional information they might acquire.

EXTENSIONS

1. Brainstorm from 10 to 15 adjectives that could be used to describe a tree. These words can be used to write a poem (haiku or cinquain) or short paragraph about the tree. Read this to your tree. (See Bibliography, numbers 125, 127, 128 and 345.)

(Continued)

2. Create and present a short story, puppet show, or play about the tree's parents and/or its offspring.

3. Imagine sounds you might hear near the tree. Can you hear leaves moving, animals, birds? Write a brief description of these sounds, inventing appropriate words, if necessary. Imagine you are looking at the tree. What colors and shapes do you see? Write a brief description, using your new words, of how the tree looks, smells, feels, and sounds.

4. Write a brief, imaginary conversation with your tree. What might your tree think, see, feel, hear, and smell? (You may wish to record the conversations on tape.)

(Role play this)

5. Imagine you are a radio or television reporter interviewing a person, bird, or animal that lives in a forest or in a tree. Write down some questions you might ask, such as: How do you like your home? Who are your neighbors? What do you do for a living?

6. Take a tree to lunch. During lunch, consider these and other questions:

   What is it like under the tree?
   What animals visit the tree while you are there?
   What kind of help is the tree getting from people, if any (watering, feeding, pruning), and does it need that help?
   Why and when does it need help?
   What kinds of things, if any, are damaging the tree?
   Has the tree cast seeds? Have any seeds developed into seedlings?
   How does the tree take care of itself?
   How much of its history can you observe? Has it had any accidents (such as being hit by lightning)?
   Is the tree crowded by other trees or by buildings?

7. See whether your tree makes a shadow. Watch the changes in your tree's shadow at different times of the day and during different times of the year.

8. See whether you can use your tree, without hurting it, to make a sundial. Can it help you keep time?

9. Make paintings, drawings, or photographs of the shapes and shades of color you find when sunlight and shadows can be seen on and around your tree.

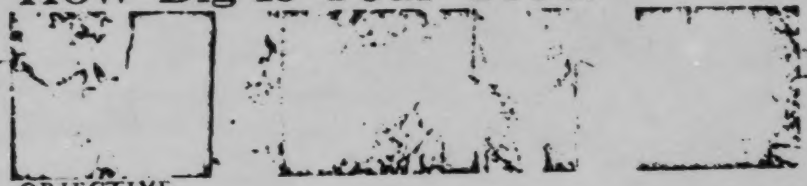
10. Describe your tree in enough detail so that someone else can recognize it. Share what you have learned by inviting someone else to visit your tree — and be sure to visit your friend's tree, too.

11. Repeat the visits throughout the year and compare observations made each time.

    Look to see how the tree has changed.
    Look to see in what ways the tree has remained the same.
    Think and talk about what the tree might look like the next time you visit it.

Lesson 4

How Big Is Your Tree?



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SUBJECTS
Mathematics
Social Studies

GRADES
K-6

PLT PRINCIPLE
3. Cultural Contexts

CONCEPT
3.421 Cultural Perceptions

SKILL
1. Gaining Information

OBJECTIVE

Students will be able to measure a tree and state the relationship between that measurement and their own size, as well as describe the need for consistency in measuring.

ACTIVITY

Discuss with your class the ways in which people in early times used their own physical forms (hand spans, for instance) to measure. Ask your students to measure things in the classroom using different parts of their bodies: foot, hand span, arm span, length of a finger, paces. Then ask the students to re-measure the same items using a standard metric ruler.

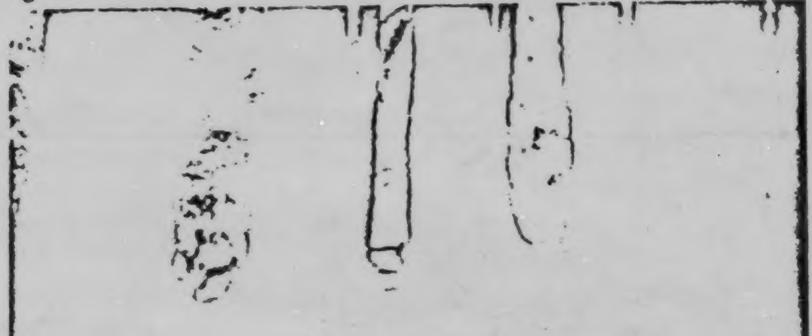
Talk with the students about the accuracy of each type of measurement. For example, "When John measured my desk he found it to be 10 hand spans, but when Joan measured it, she found it to be 11-1/2 hand spans. Why did John and Joan get different measurements?"

Ask other students to measure the desk. If they don't grasp the connection between hand size and the number of hand spans needed, have those who count the same number of spans compare the size of their hands. Are they the same? Compare the number of spans students with large hands count to the number students with smaller hands count.

Ask, "How can we be sure the measurement of my desk is consistent?" [Answer: Use the same person.]

When you are sure students understand this concept, take them outside to measure their adopted tree or another tree they choose.

Ask the students to measure the circumference of the tree by joining arms around a large tree or using hand spans on a small one. They could estimate the circumference in centimeters, then measure with a sewing tape or piece of string. Was their estimate greater than (>) or less than (<) the actual measurement?



Discussion could be held as to:

- where are the longest branches (top, middle, bottom)
- where are the shortest branches
- where is the thickest part of tree
- where is the thinnest part of tree
- where is the thickest part of branch
- where is the thinnest part of branch

36

(Continued)

On a sunny day, measure the height of a small tree, preferably one short enough for students to reach its top. Have students record the time of day when the length of the tree's shadow is the same as its height. (You could make this more sophisticated by requiring observations and data collection to predict when the shadow length = tree height.) On the next day (hope for another sunny one!), select a much taller tree and ask students to measure its shadow at the time noted the day before. Choose one student and have the class measure his or her height; ask this person to lie down with feet touching the tree trunk. A second student should mark at the tip of the first student's head. How many "student lengths" long is the shadow? Is the tree the same number of "student lengths" tall?

Students may wish to estimate how many "student lengths" the tree will be before beginning the measuring exercise. Was their estimate less than (   ) or greater than (   ) the tree's actual height?

EXTENSION

1. Classes may wish to measure nearby trees to compare with their tree.

Sherlock Hemlock (Getting to Know Your Tree)

(this is a follow-up and strengthening of
Lesson 3)

OBJECTIVE

To increase students' awareness of what their tree is really like and what its immediate environment is.

ACTIVITY

Children examine their tree's surroundings to see what kinds of life are around it: other living or non-living things such as other trees or bushes, rocks, shrubs, insects. If this is a classroom tree, what surrounds it?

- what or who are your tree's neighbors?
- does your tree have any boarders or freeloaders?
- what shape and colour is your tree?
- how old do you think your tree is?
- how did your tree get there (what evidence is around your tree--fir cones, maple wings)?
- how difficult would it be to move your tree?
- if it rained, how wet would you get under your tree?

EXTENSIONS

(1) Construct a map of how to get to your tree.

(2) Your tree has been stolen: provide a description to Sherlock Hemlock so he can find it quickly.

Lesson 6

Tree Cookies

37

OBJECTIVE

Students will be able to perceive time from the perspective of tree growth.

ACTIVITY

Obtain a large cross section of a tree which has recently been cut. Using large map pins, mark the annual rings and connect by string to a bulletin board indicating important events in a particular year of the tree's growth. How large was the tree when the school was built? When the class entered school? When the students were born? Identify differences in sizes and spaces between tree rings. Discuss with the students various reasons for these differences (drought, lack of light, etc.).

Note: The more sophisticated the class, the greater the time span that might be dealt with in this lesson.

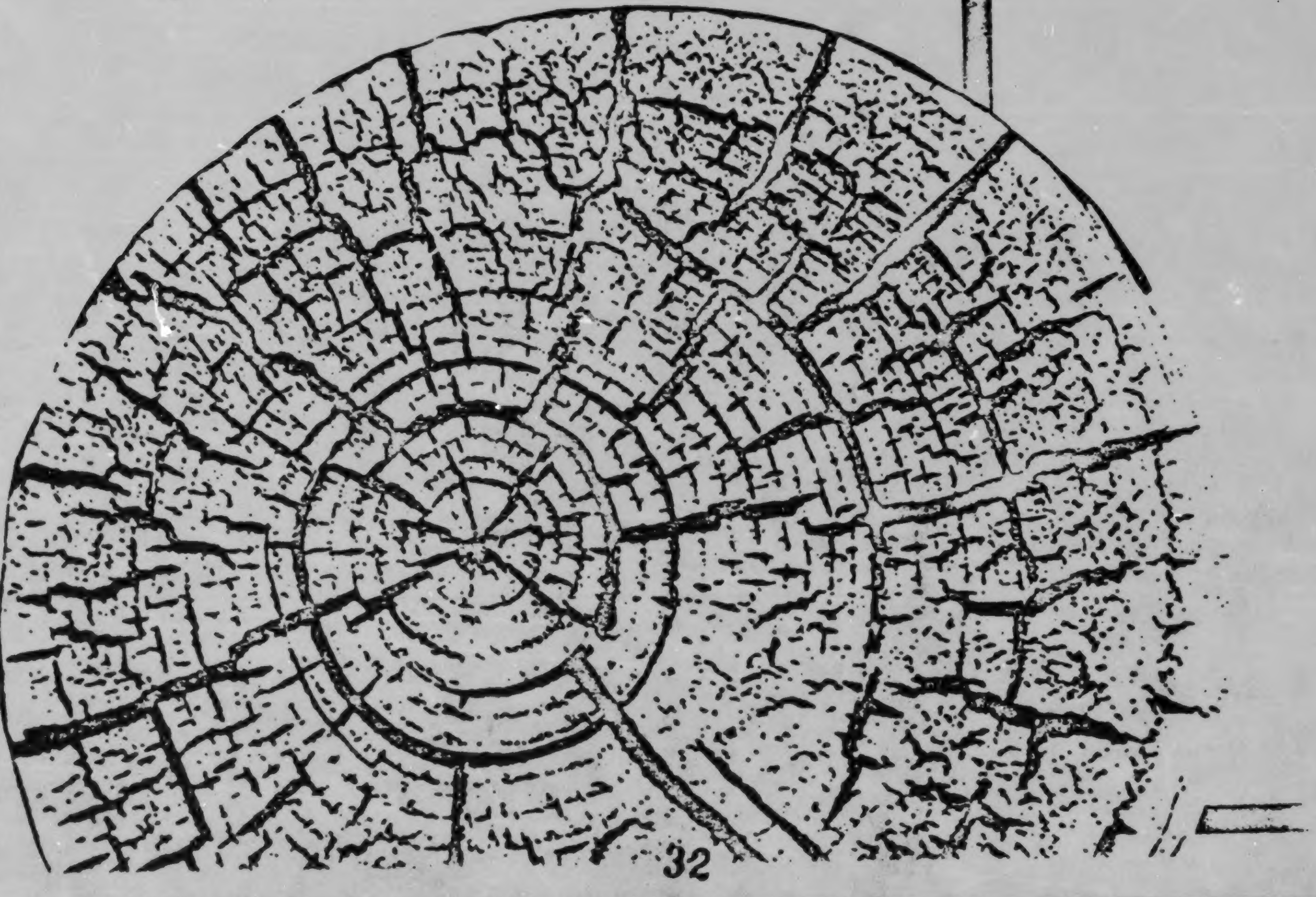
SUBJECTS
Social Studies
Mathematics
Science

GRADES
K-6

PLT PRINCIPLE
3. Cultural Contexts

CONCEPTS
3.3 History and Environment
3.33 Forest Influence on U.S. History

SKILL
1. Gaining Information



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(Continued)

VARIATION (Especially Appropriate for Younger Students)

Using 2 to 3 inch (5 to 8 centimeter) diameter tree limbs (cross section), ask students to count the rings. (Use polished pieces with no more than 10 rings.)

Explain that each ring equals approximately one year of growth for the tree or tree limb, depending on where your tree section was located on the tree. Ask:

- How old is the tree (or limb)?
- Do we have a tree (or limb) as old as you?
- How many rings would you have if you were a tree?
- Is the cross section you have "more than" or "less than" the number of rings you are old?

EXTENSION

Foresters often use a tool called an increment borer to extract a core of wood from standing trees, logs, poles, or timbers. Students could also take such cores for study. Using the technique of taking a core of wood, the age and condition of trees can be determined without destroying the tree. Students could also study such cores and analyze growth rate of trees or the penetration of wood preservative solutions on posts, pilings, or timbers.

RESOURCES

A tree (or limb) cross section can usually be obtained from a local tree-trimming service, forest industry, or utility company that is clearing or trimming trees for power or telephone lines.

See also PLT Resources section.

17

Plant Personification

SUBJECTS
Language Arts and Humanities
Science
Physical Education

GRADES
K-6

PLT PRINCIPLES
1. Environmental Awareness
7. Lifestyles
3. Cultural Contexts
4. Societal Perspectives on Issues
6. Life-Support Systems

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
7.4 Creative Expression and the Environment
3.4111 Forest Model for Creative Expression
4.311 Influence of Artistic Expressions
6.3 Interdependence of Living Things and Their Environment

SKILLS
V. Problem Solving
II. Communication

OBJECTIVE

Students will be able to portray their feelings about the forest environment through creative dramatics.

ACTIVITY

Ask your students to use both large- and small-muscle activity to move like the emotions trees might feel when there is a:

- Gentle breeze
- Violent windstorm
- Gentle rain
- Hard rainstorm with thunder and lightning
- Snowstorm
- Forest fire
- Squirrel running up their trunks
- Bird nesting in their branches
- Person climbing them
- Person carving on their bark
- Person planting them
- Person harvesting them
- Act out life cycle of tree

Your students may participate as one large group during each of these different activities; in small groups with the others observing; or singly with the other students observing and possibly guessing what activity is taking place.

(Continued)

VARIATIONS

1. Read to your students, or have them create, a short story in which trees experience events similar to those listed in the first activity. Then, the students may substitute the appropriate dramatic interpretive movements each time the word or event occurs in the story.
2. Students may wish to create a puppet show in which plant and animal characters portray their activities, impressions, and emotions related to their home in the forest during different seasons or during events like those listed in the first activity.
3. Play a recording of music which was composed to reflect events such as those mentioned and ask students to respond with large-muscle activities to the rhythms. Examples of musical selections are:

   Appalachian Spring by Aaron Copland
   Peter and the Wolf by Prokofiev
   A Walk in the Black Forest by Horst Jankowski
   William Tell Overture by Rossini
   Thunder and Lightning Polka by Johann Strauss
   Nutcracker Suite by Tchaikowsky
   Woodland Sketches by MacDowell
   Finlandia by Sibelius
   Grand Canyon Suite by Ferde Grofé
   Beethoven's Sixth Symphony
   Rocky Mountain Suite by John Denver

4. A tamborine, drum, hand clapping could be done with this.

Lesson 8

10

Tree Shapes, Natural and Unnatural

SUBJECTS
Mathematics
Fine Arts

GRADES
K-3

PLT PRINCIPLES
1. Environmental Awareness
3. Cultural Contexts

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
3.42 Environmental Perspectives

SKILL
1. Gaining Information

OBJECTIVE

Students will be able to recognize geometric shapes which occur in trees and other plants in the environment.

ACTIVITY

or magnetic board, chalkboard

Use a flannel board/or cut shapes to introduce the *rectangle, triangle, square,* and *circle.* Then, take your students on a short walk in or near the school yard and ask them to find the four shapes in various trees and bushes that they see. Back in the classroom, students can (1) sketch trees that match the shapes, (2) tear or cut paper into the shapes they found, and/or (3) use construction paper rectangles, triangles, squares, and circles, paste, and paper to make images of the trees and bushes they found on their walk.

VARIATIONS

1. Take your students outside to a place where they can see trees clearly. Give them construction paper and ask each person to tear the shape of a tree's silhouette. Talk about tree shapes. Ask students to role-play these shapes: For example, stand tall with hands above your head for a poplar tree or spread out your arms for a maple tree. Use the tree silhouettes as a means of classification (they might be triangular or tall and slender, for instance). Ask your students to locate new trees and place them in one of the silhouette categories.
2. Take your class on a short walk and ask each student to draw a tree of one shape. Then students should exchange their pictures and try to match each one with its actual tree "model" on the walk back to school over the same route.
3. Take your class outside and help them find trees which have been altered by people (examples are hedges and trees trimmed so they won't touch power lines or obstruct views). Show students a simple tally method (such as 𝍸 or : :) to record the number of trees of each species which have been changed by people.

(Continued)

Procedure:

Place a leaf between two layers of wax paper; cover with a towel; press the towel with a warm iron in order to cover the area of the wax paper, sealing the leaf between the layers.

The leaves may be cut out, with a narrow margin left around each leaf. The leaves can then be made into mobiles; displayed on windows, bulletin boards and walls; or used as covers for greeting cards.

Talk with your students about the leaf shapes and ask them to group together the pressed leaves with similar shapes. Then ask them to group together the pressed leaves with similar sizes. The students can look to see whether or not all leaves of similar size have similar shapes. The students might create a chart to classify their findings.

The leaves could be kept in a box, available to individuals and to groups of students to use in different, nonpermanent arrangements; as puzzle pieces; and for counting games.

3. Leaf crayon rub

Picking from a collection of varied leaves — possibly gathered during one of the activities above — suggest to each student that he or she, "Find a leaf that looks like your hand," or, "Find four leaves with sawtooth edges." You might ask each student to pick a leaf and then think of a riddle to go with it.

Then ask each student to lay a leaf down, put a sheet of newsprint on top of it, and use the side of a crayon to rub across the leaf. Some students will need to be encouraged to color over the entire leaf, rather than only part of it. Rubbing firmly all over the leaf will show the veins as well as the outline. A dark crayon will produce a clearer print.

Introduce vocabulary words such as vein, margin, palmate, and serrate to describe the rubbings. Then create a chart with these new words to reflect the experiences you and the students have had with the leaves.

Lesson 9

Build Your Favorite Tree
(extension of Lesson 8)

OBJECTIVE

Increase students' awareness of trees and tree shapes.

ACTIVITY

Students are to construct their favorite tree.

EXTENSIONS

(1) Students tell why their tree is meaningful to them.

(2) Creative writing.

(3) Add extra things to your tree: fruit, birds.

(4) Could be extended into a free time activity.

Lesson 10

Expanding Sensory Perception

7

OBJECTIVE

Students will become aware of their senses and be able to describe how the use of one's senses may increase appreciation and understanding of the environment.

ACTIVITY

Blindfold students, a few at a time, and ask them to feel the bark of different trees. You may want to take the students for a walk in a park, leading them carefully to different trees that have different bark textures.

Ask the students to feel the textures of leaves and needles from different trees. This should be done in the classroom first with examples of different types. Later outside in a natural setting.

Repeat this exercise without blindfolds. See if the students can identify trees, leaves, and needles they felt while blindfolded.

> Caution: Supervise this activity very closely while the students are blindfolded.

VARIATIONS

1. Take students to a place where there are several varieties of living things in close proximity. Ask all students, except one, to close their eyes. Then ask the student whose eyes are open to describe a living thing or part of a living thing using any or all of his or her senses. When the description is finished, ask the remainder of the students to open their eyes and attempt to identify the living thing described.
2. During a walk outside, ask your students to find a plant and to describe its color, how it feels, how it smells, and how it sounds. As added motivation, see who can find the fuzziest leaf, the greenest leaf, the biggest plant, the noisiest bush. You might remind them that trees are plants.
3. If a wooded area is nearby, take students on a walk through the woods during and/or immediately after a rainfall or snowfall. Ask them to describe the effects of the rain or snow on the entire forest as well as on individual plants and animals. Encourage the students to use as many of their senses as possible: How do the woods smell? How do they sound? Does it feel different to walk here now than it did before?

SUBJECTS
Health
Science
Language Arts and Humanities

GRADES
K-6

PLT PRINCIPLES
1. Environmental Awareness
3. Cultural Contexts

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
1.13 Psychological Benefits from Nature
3.42 Environmental Perspectives
3.4 People and Biosphere

SKILL
I. Gaining Information

(Continued)

4. During a short walk outside, ask students to pick up a handful of soil. Ask the students to describe — either orally, in writing, or through dramatic interpretation — its smell, its feel, its colors, and what they can find in it, such as sand, stones, leaves, worms, and insects.

5. Sight - Take students on a walk in a local forest area or park. Ask them to record shapes, patterns, or designs they see, using a pencil or crayon.

   In the classroom, ask the students to cut various geometric shapes (such as triangles, squares, rectangles). Take these shapes on a walk and ask students to match them with similar patterns in nature.

   On a walk through a wooded area, ask students to create their own color names for each shade they observe.

   Sound - Take students on a walk. Ask them to record on cassette tape the sounds they like; the sounds they don't like; animal sounds they know; animal sounds they don't know; human-made sounds and natural sounds. Play the recordings in class and ask the students to identify the sounds.

   Ask the students to imitate forest sounds (rustling leaves, wind in trees, thunder, rushing water, bird calls).

   Smell - Collect small blocks of aromatic woods such as cedar, pine, and camphor. Ask students to smell each block as you tell them its name. When they can identify correctly each block by sight and smell, take the students to a wooded setting and blindfold them. Ask the students to try to identify the trees and other plants using only their sense of smell.

   Note: You can make some woods more aromatic by wetting them. As a general rule, coniferous woods (softwoods) are more aromatic than deciduous woods (hardwoods). You can often purchase small blocks of aromatic woods. If you can't or don't want to buy them and can't find them otherwise, take care not to damage trees and other living things in gathering wood samples from forest settings. Good sources for the blocks are local furniture makers, building contractors, lumberyards, or the high school woodworking shop.

Lesson 11

Long Range–Short Range

47

OBJECTIVE

Students will be able to describe the long-range effects resulting from an action.

ACTIVITY

Pose the following situation to your students:

> *We have six fully grown trees on our land. We have no other trees around our house or anywhere else on our land. We need firewood and are trying to decide whether to cut all the trees down during next winter to use them for firewood.*

Given the information, try to decide what seems to be the best action to take.

Consider:
What will happen next summer when it gets hot. (No shade.)
What might happen the following winter when more firewood is needed to keep warm? (No fuel for cooking and heating.)
What problems might there be for animals? (Fewer places for some birds and squirrels to live.)
What might a person do to be sure that there are trees left for the future? (For example, each time a tree is cut two could be planted.)

Through discussion, emphasize to the students the differences between short-term and long-term results of actions they recommend. Ask the students to describe the long-range effects of any action they recommend.

SUBJECTS
Social Studies
Science

GRADES
K-3

PLT PRINCIPLES
4. Societal Perspectives on Issues
5. Management and Interdependence of Natural Resources

CONCEPTS
4.33 Necessity for Long-Range Planning
5.21 Plants as Renewable Resources

SKILLS
IV. Critical Thinking
I. Gaining Information

EXTENSION

(1) Children could put on a short skit for each other.

(2) Students could construct conservation posters

Lesson 12

How to Keep a Tree Happy

PLT

86

OBJECTIVES

Students will determine what trees need to be healthy.

ACTIVITIES

Initiate a discussion with your students on the effects human actions and natural actions (lightning, erosion, proximity of other growth around your tree) have on trees.

List on the chalkboard or on a chart short statements which express the ideas of your students.

Ask each student to choose one statement, draw a picture to illustrate it, and write the statement at the bottom of the picture. You can transfer the pictures with statements to stencils and duplicate them. Help your students collate and staple the pictures together to make colouring books to share with other classes in your school.

Some points that could be brought out in the discussion:

To be happy my tree needs:

- water
- sunlight
- space
- air
- nutrition--nutrients
- birds
- insect life

My tree doesn't like:

- notches
- saws
- knives, axes
- lightning
- floods
- erosions
- fires
- strong winds

continued

EXTENSION

(1) Book could be catalogued and kept in library.
(2) Booklet could be made in the shape of a tree.

TEACHER'S GUIDE
AND
INSTRUCTIONAL UNIT

PROJECT LEARNING TREE FIELD EVALUATION
British Columbia, 1980

Grade Five

THE STORY OF A FOREST

Prepared by:

Laurna Harrington - Abbottsford
Mary Isaacson - Nanaimo
Bob Smith - North Vancouver

TEACHERS' GUIDE

Grade 5 PLT Unit

Overview of the Grade 5 PLT Unit

The purpose of this unit is to provide Grade 5 students with information and activities concerning the growth of a forest and its uses.

Variation in lessons includes: modified station approach, hands on science process, field trips (some that continue for the duration of the program), and teacher directed activities.

Lessons include instructions, materials list, and suggestions for supplementary activities. The latter are merely noted but not fully developed.

Twelve lessons have been selected that vary from 20 to 40 minutes. (70% Science, 20% Social Studies, 10% Art)

The main concepts in this unit are:

"Starting the Forest" - soil, seeds

"Life of the Forest" - tree growth, succession

"Uses of the Forest" - recreation, economic

These are sequential and parallel the history of a tree.

Skills covered are those contained in the Teachers' Elementary Science Curriculum Interim Guide, 1979; thus this unit complies with the Core Curriculum.

Starting the Forest

One 30-40 min. period

SUGGESTIONS

- children should take surface soil from different areas and record locations
- save the soil to plant seeds (Lesson 2)
- students could collect both samples at the same time

MATERIALS

- soil
- one large juice can for each child
- large sheets of paper
- spoons for digging with
- glass jars with lids

SUPPLEMENTARY LESSONS

E 64: Sow Bugs 'n' Soil
E 30: Holding Power
E 62: The Fallen Log

Lesson 2

Starting the Forest

PLT
51

Growth Graph

(One 30-40 min. period plus approximately 5 min. each Monday, Wednesday, Friday, during the unit to water plants and record height)

SUGGESTIONS

- this lesson should follow closely Lesson 1 on soil.
- the lesson will extend throughout the unit.
- fertilizers could be added to some pots and their effect noted.

MATERIALS

- marigold and bean seeds
- soils used in Lesson 1
- graph paper

SUPPLEMENTARY IDEAS

E63: Seed dispersal
S81: Fertilizers
S41: PH and plant growth
- refer to supplementary ideas in Lesson 4

Science

Starting the Forest

(30 minutes)

Science

MATERIALS

- tree cookies

Starting the Forest

(Two 20-min. periods
separated by at least 4 or
5 days)

SUGGESTIONS

- this is an ongoing lesson that needs to be introduced, discussed and the experiment set up in one period, with results noted and discussed 4 or 5 days later.
- could be written up in experimental form

MATERIALS

- large leaf plant

SUPPLEMENTARY IDEAS

E-72: Plant growth and temperature

- plant fast-growing plants like string beans in different situations--high light, low light, no light--and discuss differential growth patterns

Lesson 5 deals with

PLT
63

Life of the Forest

Succession on the School Grounds

60 minutes
(could be two 30-minute periods)

SUGGESTIONS

Resource Books:

- Weeds & Seeds of Canada, available through the Queen's Printer
- Weeds of B.C. - B.C. Provincial Museum
- factors that affect succession are:
  - traffic (kids' feet)
  - soil
  - climate
  - shading by taller species
  - life span of mature species
  - fires and logging
  - seed source

MATERIALS

- art paper

SUPPLEMENTARY IDEAS

E78: Are Vacant Lots Vacant?

cience

Lesson 6 deals with

PLT
5
66

Life of the Forest

The Closer You Look

(30 minutes)

SUGGESTIONS

- these activities could be more directed by putting questions on ditto worksheets before taking students outside

MATERIALS

- pastels, charcoal or colored chalk
- art paper

Science
Art

Lesson 7 deals with

Science
Art

Life of the Forest

Leaf Prints

(30 minutes)

MATERIALS

- leaves
- 20 x 30 cm screen
- toothbrush
- straight pins
- tempera paint
- paper
- warm iron
- towel
- wax paper

SUPPLEMENTARY ACTIVITIES

E11: The "Touchy-Feely" Box"
E10: Tree Shapes, Natural and Unnatural
E16: Signs of Fall (seasonal)
E53: Healing Wounds
E59: Bursting Buds (seasonal)
E65: Web of Life

SUGGESTION

- when doing this lesson in the spring vegetable or perennial shrub or house plant leaves could be used.

PLT
89

Use of the Forest

Forest Consequences

60 minutes (could be two
30-minute periods)

SUGGESTIONS

- good art work
- good bulletin board display

MATERIALS

- butcher paper

ocial
Studies

Lesson 9

PLT
19

Uses of the Forest

The Second Little Pig

(15 minutes)

SUGGESTIONS

- teacher directed activity at the blackboard--brainstorming

Science
Social Studies

Lesson 10

PLT
22

Uses of the Forest

Maple Mallets and Ash Bats

(40 minutes)

SUGGESTIONS

- catalogues and athletic magazines are probably good sources
- make a collage

MATERIALS

- magazines and catalogues

Science
Social Studies

Uses of the Forest

Paper in the Classroom: Classroom Conservation

(40 minutes)

SUGGESTIONS

- weigh paper while the rest of the class is working on something else
- can be calculated by rows
- how many trees equals how much paper?

MATERIALS

- weigh scale

SUPPLEMENTARY IDEAS

E20: Woodwork
E21: Interview a Board Worker
E23: Make Your Own Paper
E32: Did You Ever Eat a Pine Tree?

Science
Social Studies

Lesson 12

Conclusion

Outdoor Manners Colouring Book

(30 minutes)

MATERIALS

- drawing paper

PLT
54
80

What's in Soil:
Sand, Silt and Clay

OBJECTIVE

Students will be able to describe components of soil, and become aware of the variety of particle sizes present in soil and be able to predict their influence on water movement.

ACTIVITY

Take your students on a walk and ask: What happens to the leaves, bugs, berries, and even small animals that die and fall and remain on the ground?

Divide the class into small groups. Provide a plastic or wooden box or 1.36 l juice can for each group. Let each group gather soil from a relatively undisturbed area--like a wood or a meadow, or perhaps a backyard. Dump samples on a large sheet of paper or plastic. Ask the students to pick up some soil from their sample and work it with their fingers. How does it feel? Dry--feels crumbly, falls apart easily when handled. Moist--feels damp, maybe spongy. Wet--drips when you pick it up or squeeze it. What kind of soil is this? Sandy--made up of grains of sand. Clay--sticks together in clumps. Loamy--made up mostly of dead leaves and other organic matter. Then, ask the students to identify and list the living (worms, roots, insects) and nonliving (rocks, dead vegetation, moisture) components of the soil. (This information about soil types could easily be organized later into an effective visual format!)

Talk about the trees that grow in the area in which each of the kinds of soil was gathered. Are the trees and other vegetation the same kind? Do different kinds (species) appear to grow in different soil?

Talk about possible implications of soil conditions and types for wildlife.

Save the sample to plant seeds in Lesson 2.

(continued)

SUBJECT
Science

GRADES
5-6

PLT PRINCIPLES
6. Life-Support Systems
5. Management and Interdependence of Natural Resources
2. Diversity of Forest Roles

CONCEPTS
6.21 Environmental Changes
5.23 Soil as a Depletable Resource
2.1223 Roots as Changers of Soil

SKILL
I. Gaining Information

Divide the class into several small groups of two to four students. Ask each group to collect soil from a different area, filling a tall glass jar one-quarter full of the soil and then adding water until the jar is two-thirds full. A small amount of water softener should also be added.

Ask the students to shake each of the jars vigorously for two minutes, and then allow the contents to settle for the next 15 to 20 minutes.

Now ask the students to hold a piece of paper against the side of each jar; draw a diagram showing the different layers; and label each layer based on its particle size.

Soil particles differ considerably in size and weight because some rocks and minerals are harder than others and do not break apart as easily as do the softer rocks or minerals. The largest (heaviest) pieces of soil in the glass jars will settle to the bottom first. These may be identified as *sand*. The smaller pieces settle very slowly and may be identified as *silt*. Some particles never settle but stay suspended in the water and are *clay*. Clay eventually will settle but rarely within the 15 to 20 minutes. You may want to observe the jars over a longer period and graph the build-up of the clay layer to see just how slowly it forms.

Most soils contain a mixture of sand, silt, and clay in different amounts. The size of the particles is important because it has a lot to do with how well the soil holds water for plants and how well water will move through the soil. To test this, allow the water in the jars to evaporate completely and the soil to dry. Separate out the sand, silt, and clay layers and place them in funnels lined with filter paper. Pour equal amounts of water into the funnels and record the time it takes for the first water to drop out of the bottom of the funnel. The students may predict which particle size will allow the water to pass through the fastest, which the second fastest, and which the most slowly.

Following these investigations, the students might discuss:

Which type of soil they think would be best to have in a garden, explaining their reasoning. (Encourage students to plant seeds in each type of soil to test their choices.)

PLT
51

Growth Graph

OBJECTIVE

Students will be able to graph the growth of a plant and interpret the graphic representation and the plant.

ACTIVITY

Assist students in planting a bean and/or marigold seeds in each of the pots (tins) of soil saved from first day. As the plants begin to grow, ask the students to measure the plants' heights with construction paper strips, rulers, or number lines.

Students can then transfer the measurement data to graph paper to illustrate the growth of their plants. One effective way the students can make their graphs is by gluing different, brightly-coloured strips of construction paper on poster board to represent the growth of each plant. These measurement data can be collected daily, weekly, and monthly.

Once the students have made their graphs, ask them to state the relationship between the graphs and the growth of their plants.

EXTENSION

(1) If tree seeds or seedlings are available they could be used as well as the beans and marigold, to compare growth rate.

(2) Different soil types could be used and growth rates compared.

PLT S41 PH and Plant Growth

Tree Cookies

37

OBJECTIVE

Students will be able to perceive time from the perspective of tree growth.

ACTIVITY

Obtain a large cross section of a tree which has recently been cut. Using large map pins, mark the annual rings and connect by string to a bulletin board indicating important events in a particular year of the tree's growth. How large was the tree when the school was built? When the class entered school? When the Olympic Games were held in Montreal Canada? When the students were born? Identify differences in sizes and spaces between tree rings. Discuss with the students various reasons for these differences (drought, lack of light, etc.).

Note: The more sophisticated the class, the greater the time span that might be dealt with in this lesson.

SUBJECTS
Social Studies
Mathematics
Science

GRADES
K-6

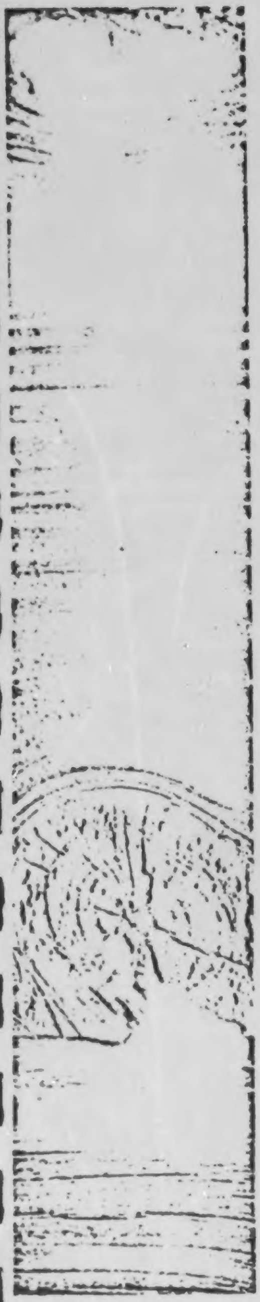
PLT PRINCIPLE
3. Cultural Contexts

CONCEPTS
3.3 History and Environment
3.33 Forest Influence on U.S. History

SKILL
I. Gaining Information

37

(Continued)



VARIATION (Especially Appropriate for Younger Students)

Using 2 to 3 inch (5 to 8 centimeter) diameter tree limbs (cross section), ask students to count the rings. (Use polished pieces with no more than 10 rings.)

Explain that each ring equals approximately one year of growth for the tree or tree limb, depending on where your tree section was located on the tree. Ask:

- How old is the tree (or limb)?
- Do we have a tree (or limb) as old as you?
- How many rings would you have if you were a tree?
- Is the cross section you have "more than" or "less than" the number of rings you are old?

61

Sunlight and Shades of Green

SUBJECT
Science

GRADES
4-6

PLT PRINCIPLE
- 6. Life-Support Systems
- 5. Management and Interdependence of Natural Resources

CONCEPTS
- 6.112 Sun as the Ultimate Energy Source
- 6.4 Biological Needs
- 5.1 Interdependence of Resources

SKILL
- I. Gaining Information

OBJECTIVE

Students will be able to describe the effects of lack of sunlight on plant leaves.

ACTIVITY

Choose a small shrub or tree with leaves which are easily reached. Ask the students to cut out several circles or squares of cardboard, each just large enough to make a good-sized "patch" on a leaf of the shrub or tree.

Show the students how to use paper clips to attach a cardboard circle or square to each of several leaves. After four days, remove the pieces of cardboard and have the class observe the lighter-colored spot on each leaf where the cardboard deprived the leaf of light.

Engage the students in a discussion of the effects of the sunlight deprivation. For example, encourage the students to wonder what might have caused the spot. Ask if any of them has ever seen this happen before? What might have caused it then? (Some students may have observed this phenomenon when they moved objects that had been placed and left on growing grass for a period of time.) Consider why plants that live in the shade are not yellow-green. Compare two leaves from the same species of plant, one from a plant growing in full sunlight and the second from a plant growing in the shade. Which one is a deeper green? How can this be?

Once the students' observations and any spin-off investigations are complete, ask them to describe the effects of lack of sunlight on plant leaves.

PLT
63

Succession on the School Grounds

OBJECTIVE

The students will find areas on the school grounds where natural succession is occuring. ("Sere" --The series of communities that follow one another in a natural succession as in the change from a bare field to a mature forest.)

ACTIVITY

Locate several areas on the school grounds where wild plant life is (a) almost absent, (b) tough weeds, (c) short grass, (d) tall grass, (e) small trees, (f) larger trees, (g) forest.

1. Have groups of students draw the types of plant found in each area.
2. Examine changes in plant density. (Number of stems/square meter.)
3. Look at changes in species composition. (Do some species become more abundant and others less abundant?)
4. Measure height of tallest plant.
5. Look for evidence of animal life or visits, including those of humans.

Ask the students to discuss apparent relationships between height and species and between environmental factors and spec in plant communities, based on the data they have acquired. I we stopped using the playground for 100 years how would the types of plants change over time? Which ones would take over from others? What would we have after 100 years? How does the concept of succession relate to the forest in general?

Lesson 6

The Closer You Look

OBJECTIVE

Students will be able to differentiate between species of trees through various tree characteristics.

SUBJECTS
Fine Arts
Science

GRADES
K-6

PLT PRINCIPLES
1. Environmental Awareness
3. Cultural Contexts

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
3.4121 Cultural Artifacts
3.42 Environmental Perspectives

SKILL
I. Gaining Information

ACTIVITY

Ask each student to make a ~~charcoal~~/ pencil drawing of a tree from memory, without using a model, and without going outside.

Then, take your students outside and let them examine several trees. You might suggest to the students, for example:

Look to see what colors you can find.
See how many different shapes of leaves you can find.
Listen to hear what sounds leaves make.
Sniff to find out what trees smell like.
Look to see if the trees seem to have fruit or flowers. If a tree has buds, describe what they look like.
Look to see if any animals (insects, birds, mammals) or plants (lichen, moss) live on the tree.
Touch the bark and leaves to see how they feel.
Notice to see if the branches point up, down, or straight out.

After the students have thoroughly explored the trees, using several of their senses, return to the classroom and ask each student to make a second ~~charcoal~~ sketch.

Make a gallery out of the pairs of drawings, comparing the differences within each pair. Look for the similarities. Look for the patterns you and the students can find repeated in both drawings. Discuss with the students any differences in their perceptions of trees since the beginning of this activity.

(continued)

SUBJECTS
Science
Fine Arts
GRADES
4-6
PLT PRINCIPLE
6. Life-Support Systems
CONCEPTS
6.32 Heredity and Environment
6.2 Constancy of Biological Change
6.4 Biological Needs
SKILLS
I. Gaining Information
II. Communication

ACTIVITY

Ask your students to look at two trees which have different color trunks, particularly noticing their barks. Suggest that each student examine some bark from each tree (generally found on the ground under a tree as well as on the trunk) and write a description comparing the two. They could use a chart similar to this one.

CHARACTERISTICS OF TREE BARK

BARK	TREE 1	TREE 2
What is its color?		
How does it feel? (rough or smooth)		
How does it look? (plain or pattern)		
Does it have an odor?		
Is the bark thick or thin?		
Do the cracks in the bark on the tree run up and down or run sideways?		

Make a bark rubbing.

Have your students make crayon or charcoal rubbings of various tree barks by holding paper against the bark and coloring over it. Then they can use the rubbings to make a poster showing bark characteristics as an aid in identifying tree species.

9

Leaf Prints

SUBJECTS
Fine Arts
Science

GRADES
K-4

PLT PRINCIPLES
1. Environmental Awareness
7. Lifestyles
3. Cultural Contexts

CONCEPTS
1.1 Variety and Aesthetics Essential to Life Support
7.4 Creative Expression and the Environment
3.42 Environmental Perspectives

KILL
1. Gaining Information

OBJECTIVE

Students will develop an awareness of the different sizes and shapes of leaves and be able to differentiate among them on the basis of these characteristics.

ACTIVITY

Art projects can be used to help students develop the ability to classify objects. These activities provide easy introductions to the classification of leaf shapes. Again, because this activity requires collecting natural materials, make sure the students take care to do no damage to their environment as they gather the necessary materials.

1. Spatter prints

Ask your students to bring a variety of leaves to school or take the class on a walk to pick up leaves from the ground.

Procedure:

Place a leaf on a sheet of paper and secure with pins. Place a screen over the leaf and paint across the screen using the toothbrush.

As the project progresses, talk with each student about the differences he or she sees in the shapes and sizes of the leaves being used. As a follow-up, ask the students to look at all the prints and group together those with leaves of similar shapes. Then ask them to group together all the leaves of similar sizes. The prints may be used to identify leaves observed outdoors during nature walks.

2. Wax paper pressing

Procedure:

Place a leaf between two layers of wax paper; cover with a towel; press the towel with a warm iron in order to cover the area of the wax paper, sealing the leaf between the layers.

The leaves may be cut out, with a narrow margin left around each leaf. The leaves can then be made into mobiles; displayed on windows, bulletin boards and walls; or used as covers for greeting cards.

Talk with your students about the leaf shapes and ask them to group together the pressed leaves with similar shapes. Then ask them to group together the pressed leaves with similar sizes. The students can look to see whether or not all leaves of similar size have similar shapes. The students might create a chart to classify their findings.

The leaves could be kept in a box, available to individuals and to groups of students to use in different, nonpermanent arrangements; as puzzle pieces; and for counting games.

5. Leaf crayon rub

Picking from a collection of varied leaves – possibly gathered during one of the activities above – suggest to each student that he or she, "Find a leaf that looks like your hand," or, "Find four leaves with sawtooth edges." You might ask each student to pick a leaf and then think of a riddle to go with it.

Then ask each student to lay a leaf down, put a sheet of newsprint on top of it, and use the side of a crayon to rub across the leaf. Some students will need to be encouraged to color over the entire leaf, rather than only part of it. Rubbing firmly all over the leaf will show the veins as well as the outline. A dark crayon will produce a clearer print.

Introduce vocabulary words such as vein, margin, palmate, and serrate to describe the rubbings. Then create a chart with these new words to reflect the experiences you and the students have had with the leaves.

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Forest Consequences

SUBJECTS
Social Studies
Science

GRADES
4-6

PLT PRINCIPLES
7. Lifestyles
6. Life-Support Systems
5. Management and Interdependence of Natural Resources

CONCEPTS
7.123 Behavior Effects on Environment
6.51 Human-Biosphere Relations
5.5 Trade-offs
5.4 Values vs Uses

SKILLS
IV. Critical Thinking
VI. Valuing

OBJECTIVE

Students will demonstrate knowledge of the effects of human and nonhuman activity in forested areas.

ACTIVITY

Provide a large piece of butcher paper and help students create a mural on it representing a forest complete with wildlife and habitat but no human beings. The mural should be contoured to show locations of mountains and valleys.

Second, lead the class in a brainstorming session to list examples of human and nonhuman activity which might be introduced into the forest environment. Then, ask the students to make a set of pictures one picture representing each item on their list. The list might include:

- Lumber mill in operation
- Roads in use
- Fences
- Beaver damming a stream
- Sewage plant
- Telephone and power lines
- Red fox hunting for food
- Tunnel
- Dam
- Reservoir
- Ski area in use
- Wilderness area
- Campfire
- Campground

(Continued)

When the pictures have all been made, ask each student, in turn, to pick a picture and choose a place on the mural where the picture could appropriately be placed. These can be tacked or pinned. Each student can explain to the class why he or she selected that location.

After all the students have had a turn, ask each student to draw directly on the mural one or more possible consequences resulting from introducing into the forest the activity shown. If you prefer to save the original mural for other uses, the students can simply make pictures of these consequences, attaching these to the mural.

Sample consequences are a dangerous mudslide, forest fire, silting, soil erosion, human recreation, noise pollution, deer population explosion, dead fish, and injured animals. Discuss with the students both the possible beneficial and detrimental effects of these consequences.

After discussion the students can make posters celebrating particular activities in the forest they think are of long-term benefit and depicting solutions to some problems shown by the consequences. If there are no known solutions to some problems, discuss the ramifications of eliminating the disruptive activities from the forest, taking care to distinguish between human and nonhuman activities and the differences involved.

Lesson 9

The Second Little Pig

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OBJECTIVE

Students will be able to identify the natural resources from which home building materials are derived, distinguishing between renewable and nonrenewable resources.

ACTIVITY

Ask your students to brainstorm a list of all the things used to build a house. Include wood products and products derived from other renewable and nonrenewable resources. Then use books, pictures, and interviews with architects, carpenters, contractors, and others involved with homebuilding to add to the list. This portion of the activity may be limited to one day or extended over several days.

Help your students group the items on this list in categories such as these, where necessary assisting the students in identifying the natural resources involved. You may wish to reword the headings to fit your students' suggestions:

Building Materials

	Exterior	Interior
RENEWABLE	Wood : Shingles Siding paint Natural Fiber Wood Plywood Shingles Shakes	Wood Paint varnish paper doors moulding cork flooring
NON RENEWABLE		

SUBJECTS
Social Studies
Mathematic

GRADES
K-9

PLT PRINCIPLE
2. Diversity of Forest Roles

CONCEPTS
2.111 Resource Needs for Human Dwellings
2.11 Need for Forest Products

SKILL
1. Gaining Information

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Maple Mallets and Ash Bats

BJECTS
Physical Education
Social Studies

RADES
K-6

PLT PRINCIPLE
2. Diversity of Forest Roles

NCEPTS
2.1 Forest Uses and Values
2.112 Forest as Resource Pool
2.1242 Forest-Dependent Leisure-Time Activities

ILLS
. Gaining Information
V. Problem Solving

OBJECTIVE

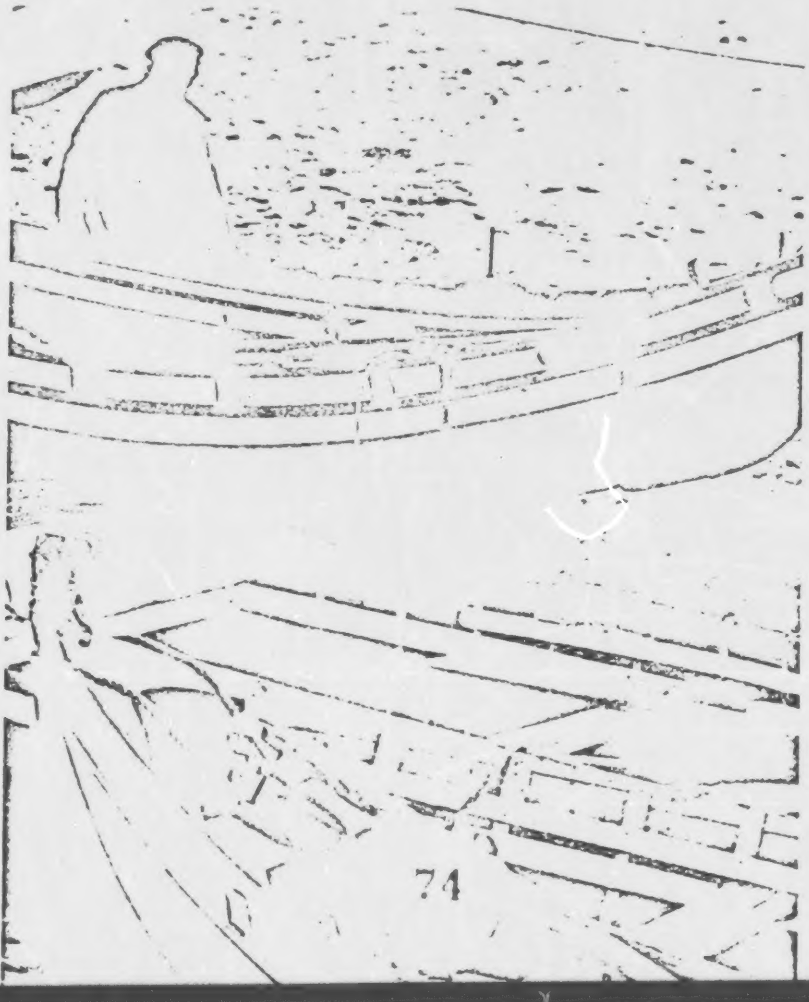
Students will be able to identify ways forest products are used in recreational activities.

ACTIVITY

Ask your students to find pictures of items which are made from wood and used for recreational purposes; for example, bat, tennis racket, golf clubs, croquet mallet and balls, piano, swing seats, bowling alley floors.

These pictures can be used by the students to create a bulletin board or display.

To heighten interest, you might create categories such as the most unusual recreational use (celluloid film?), the biggest use (sailing ships?), and the oldest (dugout canoes, kites?).



Paper in the Classroom:
Classroom Conservation

OBJECTIVE

Students will become aware of the quantity of paper required for their use in school, be able to calculate the average amount of paper consumed by each student each week, and be able to suggest ways that paper and other natural resources can be re-used and recycled in the classroom.

ACTIVITY

Ask each student to weigh all the paper in his or her desk, including books, notebooks, writing paper, and drawing paper. (A postage scale works well for this.) Create a master list of the totals each of the students provides; then ask each of the students to add the numbers to make a grand total for the class. Another way to determine the grand total is by "weighing in" one by one: start with your desk; the first student adds his or her total to yours, and so on until all the paper is weighed.

After the total paper weight in class has been computed, ask each student to solve these problems:

1. Use long division to determine the average weight of paper per student.
2. Use multiplication to calculate the approximate total weight of paper used by all students in the building. (Use the average weight/student found in the first problem.)
3. Calculate an estimated total weight of paper for each of the other classrooms in the building. (use the average weight/student from the first problem.)

(continued)

For one week, ask your students to save all waste paper generated by class activities. Assign groups to separate the papers into two stacks each day: One for paper that has been completely used and the other for paper that could be used again for some purpose.

At the end of the week, compare the amount of paper in the stacks and lead a class discussion on "Are we wasting paper?" Give each group some of the reusable paper, pencils, and one of these articles: grocery bag, shoe box, magazine, gift-wrap paper, Christmas cards, newspaper, lunch sack, milk carton.

Ask each group to list on the paper all the ways they can think of to reuse the article. After 10 minutes, share the ideas. Repeat this exercise with articles like ditto paper and other items commonly used in the classroom, such as pencils and crayons. You and the students can act on the suggestions you consider most worthwhile, making them a part of your classroom way of life.

Make a list of specific things you can do to use the natural resources in your classroom more wisely.

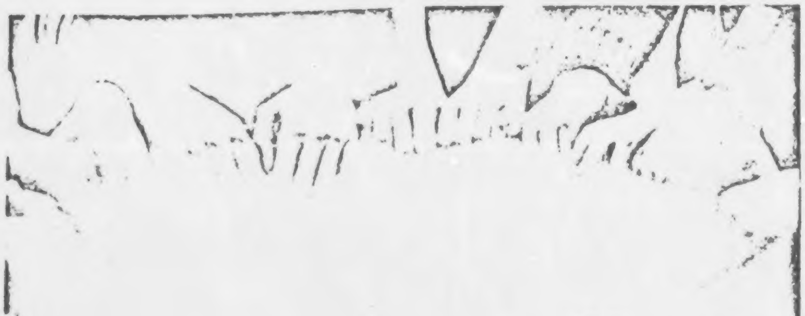
SUBJECTS
Social Studies
Fine Arts

GRADES
K-6

PLT PRINCIPLES
7. Lifestyles
5. Management and Interdependence of Natural Resources
2. Diversity of Forest Roles

CONCEPTS
7.31 Consumer Effects on Forest
5.12 Renewable Resources
2.112 Forest as Resource Pool

SKILLS
V. Problem Solving
VI. Valuing



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Outdoor Manners Coloring Book

SUBJECTS
Language Arts and Humanities
Social Studies
Fine Arts

GRADES
K-6

PLT PRINCIPLES
7. Lifestyles
4. Societal Perspectives on Issues

CONCEPTS
7.3 Resource Depletion Prevention
4.43 Constraints on Resource Use
4.311 Influence Expression and the Environment

SKILLS
I. Gaining Information
II. Communication
VI. Valuing

OBJECTIVE

Students will be able to recommend appropriate actions to take while in the outdoors and specifically in forests and public parks.

ACTIVITY

Initiate a discussion with your students on the effects human actions can have on the outdoors. You might begin by showing a film or reading aloud a story on behavior in the forest or public parks. (See Resources #196.)

List on the chalkboard or on a chart short statements which express the ideas of your students. Ask the students to offer ideas in the form of behaviors they would recommend. Examples are:

- Be careful not to litter. If possible, pick up any litter left by others.
- Use the trash can.
- Don't carve or abuse any living trees or plants.
- Respect all wild life.
- Be careful with fire.
- Stay on the marked trail when asked.

Ask each student to choose one statement, draw a picture to illustrate it, and write the statement at the bottom of the picture. You can transfer the pictures with the accompanying statements to stencils and duplicate them, or make a bulletin board display. Help your students collate and staple the pictures together to make coloring books to share with other classes in your school.

[illegible]

ON

INSTRUCTIONAL UNITS

PROJECT LEARNING TREE FIELD EVALUATION

British Columbia 1980

Grade Seven

THE USE OF OUR FOREST:
CAN WE DECIDE?

Developed by:

Mauri Clemons - Richmond
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The Use of Our Forest -
Can We Decide?

TEACHERS' GUIDE

OVERVIEW OF UNIT

Goal

The goal of this unit is to help students develop skills in evaluating information and in making careful decisions pertaining to forest use rather than to indoctrinate them with "right or wrong" opinions.

PRELIMINARY NOTES

1. Throughout the unit many references are made to field work and non-classroom oriented activities. The teacher may find that, because of time limitations, these activities are not feasible. It is hoped that the overall outcomes will still be achieved without these activities.

2. It is important to point out at this time that the teacher must not present biased views concerning forest use. There is no right or wrong use, only an appropriate use, depending on the time and place.

3. Note that in Lesson 11 you will be required to have a visit from the town planner or some community official.

UNIT OUTLINE

Time Allotted: 2 hrs/wk
7 weeks
14 lessons

A. Introduction: What is a Forest?

B. Products from the Forest.

C. Classification of Forest Products for Compatibility.

D. Examination of Two Major Forest Products (Wood and Recreation).

E. Focussing Attitudes on a Range of Values.

F. Processes of Decision Making.

LEARNING OUTCOMES

- Students will become aware of the various components of the forest. Students will be able to place values on forest components.
- Students will be able to identify ways in which forest products are an integral part of contemporary lifestyles in their country. (For a balanced view include such products as: wood, recreation, animals, food, minerals.)
- Students will be able to identify compatible kinds of land uses and to describe their criteria for judging compatibility.
- Students will be able to describe how trees make life more pleasant for people.
- Students will examine problems of overcrowding and overuse of public recreation areas.
- Students will be able to identify the natural resources from which home building materials are derived, distinguishing between renewable and nonrenewable resources.

- Students will be able to identify some of their own uses of wood products, suggesting ways they might appropriately change their own lifestayles to more effectively make use of this natural resource.

- Students will demonstrate knowledge of the effects of human and nonhuman activity in forested areas.

- Students will understand how land use decisions are made and by whom.

- Students will be able, through their realization of the implications, to make a decision concerning the use of a plot of forested land.

LESSON NOTES

Lesson 1

1. Teacher should be prepared with information concerning lumber, watershed, wildlife, recreation, minerals and forage relevant to his/her community.
2. Omit mathematical values.

Lesson 2

Insure that a wide variety of forest products is covered: e.g. wood, recreation, animals, food, minerals.

N.B. In lessons 4, 5, 6 and 7 focus is placed on wood and recreation products. Make sure that positive and negative aspects of both products are covered.

Lesson 4

Re drawing--keep simple--a quick sketch only. Teacher may wish to provide pictures, also emphasis placed on discussion.

Lesson 5

Select appropriate portions of lesson.

Lesson 6

Emphasis toward wood products as being renewable.

Lesson 8 and Lesson 9

These lessons are in two parts, providing a bridge to the next section.

Lesson 10 and Lesson 11

Official visit in Lesson 11 by planner.

Suggestions of Visitors

- town planner - city manager - parks superintendent - mayor, etc.	Devote time to helping the students develop illuminating non-threatening questions.

Lesson 12

Choose a local, plausible area and select roles appropriate to the community.

Unit - Grade 7
14 - 1 hr. lessons

THE USE OF OUR FOREST - CAN WE DECIDE?

Lesson 1 What is in a Forest?

Brainstorming session. Children make a list of what is in a forest. Assign values as indicated.

Reference: S53
S54

Lesson 2 Forest Products All Around Us

Reference: S9
S43
S12
S13
S51

Lesson 3 Classifying Forest Products for Compatibility

Reference: S37
S38

Lesson 4 With or Without

Reference: E24

Lesson 5 Loving it to Death

Reference: S80
S79

Lesson 6 The Second Little Pig - His House of Wood

Reference: E19
S68
S69

Lesson 7 A Look at Lifestyles

Reference: S88
S 9

Lessons 8 and 9 Forest Consequences

Lesson 8 - Mural preparation
Lesson 9 - Discussion and elaboration of consequences

Reference: E89
E47

The next two lessons are based on "Who Runs this Place".

Reference: S33
S36

Lesson 10 Who Runs this Place?

Student preparation for visit by official.

Lesson 11 Official Visit

Questions and problems formulated by students in Lesson 10 directed to visiting official.

The following three lessons are based on "My Use or Your Use or Our Use" and constitute the culmination.

Reference: E45
S36
S37
S38

Lesson 12 My Use or Your Use or Our Use

(first part)

Lesson 13 Research and Preparation Time

Lesson 14 My Use or Your Use or Our Use

(second part)

Presentation to mock council as in last paragraph p. 76.

References:

P.L.T. Books E & S *

P.L.T. B.C. Bibliography SE-1

B.C.T.F. Lesson Aids

Canadian Forestry Association Publications

Core Curriculum: G6, H7, I4, L5, L6

Elementary Science Curriculum Guide:
    Program B--Its Your Decision, Imbalance, Land Management

    Program C--Ecology - Interaction,
            Earth - Its Nature

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* In addition to actual lessons, note Glossary, Curriculum Framework, Topic Index, and Subject Titles at the back of each P.L.T. book.

Lesson 1

PLT
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What is in a Forest?

OBJECTIVE

Students will become aware of the various components of the forest.

ACTIVITY

- brainstorm
- the variety of uses (economic, aesthetic, genetic, etc.) to which any area of forest land may be put.

Lumber Value -- Choose an area of forest land and count the number of trees. Find out from a local resource agency or fores industry representative how to make a rough estimate of the number of cubic metres yielded per tree and the number that coul be obtained from 100 hectares. Check with a lumberyard to determine the retail price of lumber per 1 cubic metre. Contact a timber company and ask the cost of converting trees to a cubic metre of lumber and transporting the product to the lumberyard. Subtract this amount from the retail price quoted by the lumberyard. What might this 100 hectares of forest be worth in dollars for lumber?

Note: This figure does not take into account marketable byproducts; for example, particle board or pressed wood logs.

What might be the value of this forest land and its lumber other than as measured in dollars; for example, as a source of inspiration and solitude.

Watershed Value -- Discuss the concept of a watershed and the ways in which a forest affects the amount of water available in an area.

Using the same 100 hectares as the sample, check the amount of rainfall in that area and calculate the rainfall on 100 hectares. Amount of rain (in metres) x 10,000 square metres = cubic metres of water/hectare ÷ 100 = water falling on 1 hectare. From the local water company, find out the money value of a cubic metre of water. What is the money value of the amount of water that fell on the sample plot?

From the Department of the Environment or your local Weather Office find out what percent of the rainfall they estimate does go into sources (aquifers, streams, etc.) available for human consumption. How would this compare with the same amount of rainfall, falling on a plot of the same size in open prairie, for example?

Social Studies
Science
Vocational
griculture

(Continued)

Calculate approximately what the forest is worth economically to people as a watershed. Attempt to calculate what the forest is worth as a watershed to living things other than people.

Wildlife Value — Find out what types of wildlife inhabit this forest land. How many animals and birds? Are there any, such as deer, turkey, or quail, which are hunted by humans? Determine how much money hunters spend locally on licenses, guns, ammunition, equipment, lodging, travel, and guides. Include any forms of nonconsuming uses related to wildlife (photography and bird watching, for instance) that generate economic income in this area. What is the total wildlife value (as measured in dollars) of this land?

Describe the wildlife value of this land other than in dollars; for example, as a gene pool for future generations.

Recreational Value — Determine what forms of recreation take place in the forest. Find out what camping or parking charges are levied per day. How many people use this forest for camping or other recreation, and how much money do they spend in the area? What is the total recreational value measured in dollars? What recreational values in the forest are not easily measured in dollars?

Forage Value — Determine whether cattle or sheep could use this land for grazing. How many animals could it support? How much are the animals worth on today's market? What are the total forage values, economic and other values?

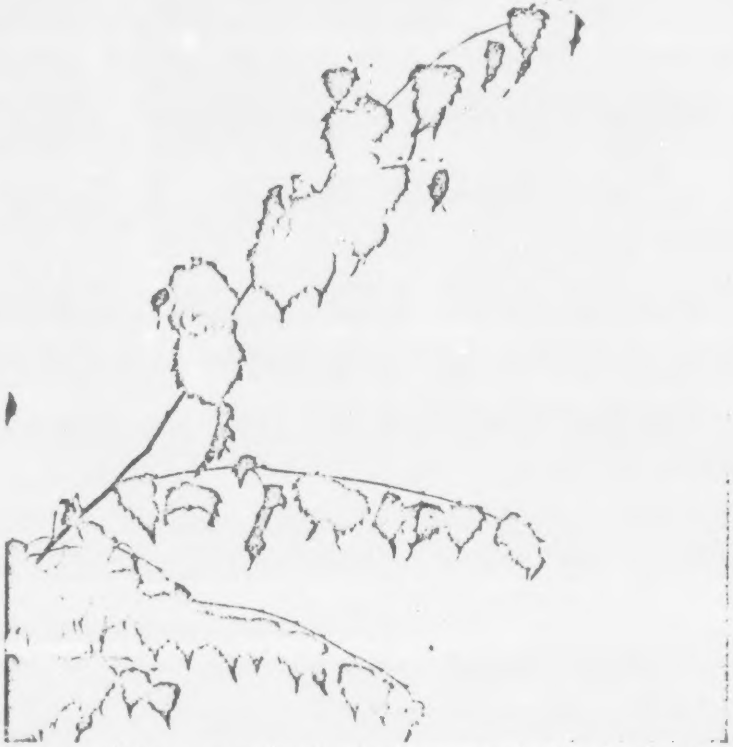
Note: The forest's intangible values of wildlife, meteorological influences, and aesthetics may be harder to calculate but are nonetheless real and worthy of consideration. Each of the sections above asks the students to invent other ways to determine value than dollar income.

After all the information has been collected, researched, and shared by the class, lead a discussion. Students may not be able to resolve the issues involved, but they may become aware of the complexities of land-use management. Consider specific questions such as:

If the community wanted to clear this 100 acres (or 100 hectares) of forest in order to build homes, provide farm sites, or put in a highway, how would the proposal influence the land's value? Decide which uses make the land more valuable. To whom? Specify how you are measuring value. Find another way to measure value. Does your answer change?

Decide whether the various values determined for this 100 acres (or 100 hectares) could be applied to other areas of the same size but of different forest types. Specify what variables might make a difference in the economic, or the "intangible," values of the area, and from whose viewpoint.

(Continued)



Decide which uses make the land more valuable in the long run, specifying from whose point of view and by what means the value is measured.

What trade-offs are involved when we convert forest land from multiple use or a few dominant uses? Society needs houses, farms, and roads, but we also need forests. Decide whether and how we can have them all.

Find out who determines the uses of forest land.

*Students may find any of the following to be useful in their research:
Newspaper advertisements
Water company/municipal waterworks
Local lumber businesses and foresters

Lesson 2

9

Forest Products All Around Us

SUBJECTS
Social Studies
Home Economics
Industrial Arts

GRADES
7-12

PLT PRINCIPLES
2. Diversity of Forest Roles
3. Cultural Contexts
5. Management and Interdependence of Natural Resources
7. Lifestyles

CONCEPTS
2.11 Need for Forest Products
3.1 Resource Base for Economy
5.12 Renewable Resources
5.121 Efficiency of Resource Use
7.1221 Conflicts in Consumption Patterns
7.2 Cultural Effects on Resources
7.3 Resource Depletion Prevention

SKILLS
I. Gaining Information
II. Communication
IV. Critical Thinking
VI. Valuing

OBJECTIVE

Students will be able to identify ways in which forest products are an integral part of contemporary lifestyles in their country. (For a balanced view include such products as: wood, recreation, animals, food, minerals, etc.)

The forest industry, like every other industry based on a major natural resource, provides goods which are integral parts of our country's economy and lifestyle. In turn, the continuing supply of those integral parts depends upon the intelligent management of the forest resource. Management options and policies ultimately are influenced by consumer demand for products and services.

Ask students to list at least ten distinctly different products they know of which are made from wood. Invite them to move around the classroom and carefully observe everything as they look for wood products. After allowing sufficient time for them to discover and think of other wood products — and to verify the derivation of some products (There are often surprises with this activity!) — create with them a master list. Item by item, discuss, investigating further where necessary:

What would happen if suddenly this product were unavailable.

Whether this product's disappearance would affect any of the essentials necessary for survival as, for example, food or shelter. What things are truly *necessary* for survival? Decide.

Whether the product's current use is wasteful. How? If it is, whether the use might be eliminated. Determine the possible impacts if it were.

Suggest a substitute for this forest product. Is the substitute made from a renewable or nonrenewable raw material? What would be the environmental impact of the substitute?

(Continued)

Allow 15 minutes for each student to list ways he or she uses paper and other forest products within a specified time period, such as a year. Ask students then to draw a line through items on their lists they believe are least important to them and to circle three items they consider essential or most important.

Next to each of the three top priority items, ask students to write down a product or material which could be substituted for it. For example, instead of using paper to record thoughts, cassette tapes could be substituted.

After time for investigation by the students, lead a class discussion on the comparative merits of the alternatives proposed:

The environmental and economic factors involved.
Whether the substitute serves the same purpose as efficiently and as cheaply.
Whether the substitute is made from a renewable or nonrenewable raw material.
Whether the substitute will require more or less energy to produce than the original forest product.
Whether there are any long-term implications for continued use of the priority items and/or substitutes for them.

Ask your students to brainstorm a list of environmental factors affected by the forests. The list might include such things as water quality, air quality, and landscape aesthetics. Invite each student to choose one item from the list and create a poster advertising its value to people, other organisms, and/or the biosphere. Posters can be displayed, shared with other classes, and discussed.

Organize a wood-finding tour of the retail marketplace. To accomplish this, you may get permission from a store manager and make a class visit to a local department store, *or* you might even use a mail-order catalog in the classroom. As a preliminary step, ask students to make up a survey sheet for recording information. Divide the class into teams of three or four students each and ask each team to name one of its members as "recorder." The recorder can log team observations on its survey sheet.

Each team can pick a different department in the store or a different section of the catalog. Ask students to identify and record as many items as they can which use wood or other forest products. Additional information such as unit cost and place of origin also may be gathered.

(Continued)

After data have been collected and tabulated, discuss:

How your lifestyle might be altered if forest products suddenly become unavailable.

How many items listed represent basic survival needs. Determine how you decide which are needs and which are only wants.

Using existing technology, what substitute you might find for any of the items listed. Identify the environmental and economic tradeoffs involved.

What factors (lifestyles, population growth, management, increased demands of the Third World) might affect the supply and price of forest products.

Ask your students to brainstorm a list of forest products used in these areas of home living:

- Kitchen (cutting board, knife handles, and ?)
- Interior (furniture, shutters, coat hangers, and ?)
- Maintenance (broom handle, vacuum cleaner bags, and ?)
- Food (vanilla, nuts, wild game, and ?)
- Exterior (fence posts, picnic table, and ?)

Which of the items listed are necessary for human survival?

Which of the items are wasteful and which reflect sound conservation practices? Specify what criteria you used to make this judgment.

Which of the wasteful products are you willing to eliminate or find a substitute for? Determine what the environmental and economic impact on our society would be if everyone avoided the wasteful products.

Look at the items you decided were essential. Find out whether there are materials available, using existing technology, that could be substituted for the forest products used. Determine what environmental and economic trade-offs would be involved in the substitution. Compare the efficiency of the substitute material with that of the forest product.

EXTENSIONS

1. Conduct this activity including a walking tour of the school area.
2. Invite students to add inputs to the list from home, family members, and other people.

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Classifying Forest Products for Compatibility

SUBJECT
Social Studies

GRADES
7-12

PLT PRINCIPLES
4. Societal Perspectives on Issues
5. Management and Interdependence of Natural Resources
2. Diversity of Forest Roles
7. Lifestyles

CONCEPTS
4.3 Flexibility in Resource Management
4.4 Variety in Use
5.4 Values vs Uses
2.1 Forest Uses and Values
2.124 Aesthetic Benefits
2.1242 Variety of Leisure-Time Activities
7.211 Pressure on Forest Recreational Facilities

SKILLS
III. Social Participation
V. Problem Solving
VI. Valuing

OBJECTIVE

Students will be able to identify compatible kinds of land uses and to describe their criteria for judging compatibility.

ACTIVITY

Hold a brainstorming session with your class with the objective of developing four lists relating to land use.

The first list should include *personal uses*, such as fishing, hunting, hiking, camping, rock climbing, and snowmobiling, which can take place in a forest environment.

The second list should include *commercial uses*, such as logging and mining.

The third list should include and reflect *community values*, such as watershed protection, wildlife habitat, and aesthetics, which the same forest might provide.

Focus the fourth list on identifying *interest groups* that would be likely to represent or promote each of the uses or values mentioned in the first three categories. Examples are motorcycle clubs, environmental groups, hunting and fishing clubs, forest industry organizations, ski-resort owners and developers, and real estate brokers. Ask students to role-play members of these groups as they construct a "conflict matrix."

After conflicts have been identified by the matrix, groups with incompatible self-interests can meet to attempt to work out a solution. While attempting to reconcile their conflicts, students could consider:

Are any of the activities always in conflict or does the incompatibility vary with time and in intensity?

What characteristics of the conflicting activities make them incompatible?

What criteria are you using to determine incompatibility?

Do you believe the conflicts will become more or less frequent in the future? Why?

What must each group be willing to sacrifice in order to reach a compromise?

What are the benefits of each compromise to the interest groups, the individual, the community, the rest of the nation?

A dramatic difference in goals frequently separates those who would preserve the environment from those who would develop its resources for economic purposes, including some kinds of recreation. Both factions often vigorously insist they are conservationist.

This activity explores the value systems represented by each position in an attempt to understand more fully what each means by "wise use." The activity is also designed to assist students in clarifying the meaning of the terms conservation and preservation.

Show students a photographic slide or print of people engaging in some sort of recreational activity – picnicking, taking photos, sightseeing, skiing or backpacking in a forest setting. Discuss:

Do the students know anyone who uses the forest in these ways?

What needs do these experiences and activities satisfy? List the needs, such as "desire for solitude" on the blackboard.

What values are exemplified by these forms of use?

What is conservation? What is preservation? Establish definitions for each.

Repeat the exercise, substituting pictures of other uses of a forest setting, involving "harvesting" the forest resources. Discuss:

How do the needs and values related to the first category of uses differ from those in the second?

Are any of these uses, or the values they represent, in conflict? If so, which?

Is the conflict always present or does it disappear at certain times? For example, while the forest regrows to fill a cut-over area, timber harvesting may no longer conflict with camping, bird-watching, or hunting.

Which of the uses would you classify as:

- wasteful consumption
- reasonable consumption
- a form of preservation
- a form of conservation?

Are there any relationships among these classifications? For example, is it possible for a consumption use also to be an example of preservation? In what circumstances? How might these circumstances differ in different settings? At different times?

Which of these activities appear to be wise uses of the forest resource? For the short term? For the long term? On what criteria do you base your decision?

SUBJECTS
Social Studies
Language Arts and Humanities

GRADES
7-12

PLT PRINCIPLES
4. Societal Perspectives on Issues
2. Diversity of Forest Roles
5. Management and Interdependence of Natural Resources

CONCEPTS
4.13 Value-Loaded Language
4.14 Consideration of Reality
2.1 Forest Uses and Values
2.124 Aesthetic Benefits
5.1 Interdependence of Resources

SKILLS
I. Gaining Information
II. Communication
III. Social Participation

Lesson 4

24

With or Without

SUBJECTS
Social Studies
Science

GRADES
4-6

PLT PRINCIPLES
2. Diversity of Forest Roles
1. Environmental Awareness

CONCEPTS
2.1234 Forest-Water Cycle
2.1244 Aesthetic Contributions of Forests
2.12 General Dependence on Forests
1.1 Variety in Aesthetics Essential

SKILLS
VI. Valuing

OBJECTIVE

Students will be able to describe how trees make life more pleasant for people.

ACTIVITY

(Be sure to keep this brief.)

Divide your class into four or five groups. Ask each group to draw one of the following areas — both with and without trees:

- Golf course
- Picnic area
- Campsite
- City park
- Playground
- Farm
- Other areas students suggest

Display the drawings before the class. Lead a class discussion to compare a treeless facility with a facility that has trees. What do trees contribute aesthetically to these facilities? Besides their aesthetic value, how else do trees and other plants improve the environment? For example, how do plants contribute to air quality? Which environment do you prefer — with trees or without them? Why?

(Continued)

VARIATIONS

1. *Plantless place*

   At the beginning of this activity remove any plants from the classroom. *Wait a week or two*. Then, quietly involving a few students without the others knowing, ask the few students to bring from home houseplants which may be borrowed for a week or two, or obtain plants from a high school horticulture class, a local florist, or other teachers. Place the plants in the classroom (5 to 15 houseplants suggested) and let a few days pass without saying anything about the plants. The students will be likely to comment; just grin without offering any evaluative remarks. After this time ask all of the students to make written observations describing any changes they have noted in the room. Encourage the students to include their feelings about plants in the classroom environment. Did they prefer the room with or without plants? What other changes might they like to make in the classroom environment? With the students agreeing, you and they can try to make those changes.

2. *Landscape design*

   Ask students to draw or paint a picture depicting a home in which they would like to live. Special attention should be paid to the landscaping of the grounds. Pursue a discussion of the reasons students landscaped their yards in the manner they did. Possible questions:

   What kind of plants did you use?
   What other natural resources would likely be involved in maintaining your plantings?
   Did you place them where you did for any special reasons?
   What do you plan to use the plants for (for example, climbing, building a tree house, food, decoration)?
   What value do plants have around a home? A school? An office building? A street?
   Will any forms of wildlife benefit from the plantings?

Lesson 5

80

Lovin' It to Death

OBJECTIVE

Students will examine problems of overcrowding and overuse of public recreation areas.

ACTIVITY

Hold a class discussion on questions such as the following.

1. Under what circumstances, if any, might citizens appropriately be prevented from entering and using a public recreation area?
2. What circumstances may have caused the tremendous increase in outdoor recreation activities?
3. Should our existing public recreation areas, such as national parks and forests, be managed to accommodate more visitors? If so, how? What problems might be solved and what problems might be created by your proposal?
4. Is recreation the only purpose of the various public recreation areas (national and state parks and forests, wilderness areas, wildlife refuges, estuaries)? Is it the primary purpose? What was the original intent of establishing each of these areas? Has the intent changed? How and why? Does it appear that any other changes are necessary or appropriate? Describe your reasoning.
5. Does it appear that more public recreation areas should be established? If so, what kind, how many, and where? What impact might the increase have on the use of resources for other purposes? What possible trade-offs are involved? Would you be willing to accept these trade-offs? State your reasons. (This issue might warrant a debate if there is sufficient student interest.)
6. It has been advocated that parks be sold and the "park experience" be priced at its "true economic value." The reasoning is that this would eliminate the need for quotas, as the cost would make park use self-regulating. What do you think about this proposal? (See Variation I for expansion on this theme.)
7. If you sleep in a state or national park, do you pay all the costs? If you sleep in a hotel in the city, do you pay all the costs? If there is a difference, why?
8. Other proposed solutions are to increase facilities and to open up the wilderness areas. To these ideas Bob Marshall replied, "Only a small minority enjoy art galleries, libraries and universities. Yet no one would suggest making these facilities into bowling alleys, circuses or hot dog stands just because more people would use them." Do you agree with his rebuttal?
9. If our population and our cities continue to expand, would you anticipate a still greater demand on these recreation areas? What other factors might affect trends in recreation? The Bureau of Outdoor Recreation estimates that recreation demand will triple by the year 2000. However, because of the gasoline shortage, national forest recreation use was less in 1973 than the year before. Does this information alter your opinion?

10. If it were possible to create more parks in urban areas, how might this affect the demand on national parks?
11. What other possible means are there for attempting to most effectively maintain and use our national recreation areas.

EXTENSION

1. Garrett Hardin has termed situations similar to the one described at the beginning of this activity as "The Tragedy of the Commons." (See his article of that title listed in the Bibliography.) Briefly his theme is that in the beginning everyone using a "common" or publicly owned or shared resource benefits from that resource, but as each tries to increase the benefits he or she receives from the commons by making more use of the resource, the use becomes so intensified that no one benefits, not even at the original level. Hardin uses the example of ranchers grazing sheep on a commonly held area and each adding sheep until the common becomes so overgrazed that no one benefits. The theory applies equally well to other resources.

   Two possible solutions to the problem of the commons are (1) regulate its use, or (2) place it in private ownership and charge for its use, letting price set by supply and demand allocate the limited resource.

   To explore the concept of the commons and the proposals for solutions to problems it generates, ask students to read Hardin's article and/or view the film titled, "The Tragedy of the Commons" (also listed in the Resources). Then compare the situation described for this activity with the idea of the commons. Discuss:

   - How does the situation in the national and state parks and forests illustrate the concept of the commons? What other things (such as air and water) has society treated as commons?
   - How have we attempted to solve the problem of the commons (through means such as regulation and price)?
   - Which, if any, of these means could be used to solve problems of overcrowding and overuse in existing parks? Do they offer advantages over expanding or adding more parks? Disadvantages?

   Note: At this point, you may wish to introduce the idea of selling the parks, if this thought has not yet been expressed. If the students show enough interest, divide the class into two groups to debate the question:

   "Pricing the park experience at its fair market value would be the most appropriate solution to overcrowding in our national parks and wilderness areas."

80

(Continued)

2. In conjunction with the first activity, obtain and show one or all of these films. (See Resources for information on sources.)
   For All to Enjoy
   Pave It and Paint It Green
   The People's Heritage

3. After reading the initial activity, ask each student to create a mock application form for visiting a national park, forest, or other public recreation area. The form could include such things as the student's name; real or fictitious name of the area the student wishes to visit; date of visit; reasons for the visit; and activities the student wishes to pursue in the area.

   On the chalkboard, list the activities mentioned on the application forms. Ask students to devise categories where each might be placed.

   Do any of the activities reflect social needs such as peace and quiet?

   Do the activities reflect interests and abilities of the entire population? Can any be pursued by the elderly or the physically handicapped?

   Are some of the activities in conflict, such as fishing and water-skiing? What methods, such as time and spatial zoning or adding recreational areas, could be used to minimize the conflicts?

   Do your students believe that the reservation system increases or decreases freedom of choice for the individual or for an interest group?

   What are some of the reasons for the need for a reservation system? Can your students suggest ways to solve the problem of overcrowding without using this system? What are the social, economic, and environmental implications of the students' proposals?

Lesson 6

19

The Second Little Pig - His House of Wood

OBJECTIVE

Students will be able to identify the natural resources from which home building materials are derived, distinguishing between renewable and nonrenewable resources.

ACTIVITY

Ask your students to brainstorm a list of all the things used to build a house. Include wood products and products derived from other renewable and nonrenewable resources. Then use books, pictures, and interviews with architects, carpenters, contractors, and others involved with homebuilding to add to the list. This portion of the activity may be limited to one day or extended over several days.

Help your students group the items on this list in categories such as these, where necessary assisting the students in identifying the natural resources involved. You may wish to reword the headings to fit your students' suggestions:

Building Materials

	Exterior	Interior
RENEWABLE	Wood: Shingles Siding paint Natural Fiber Wood: Plywood Shingles Shakes	Wood Paint varnish paper doors moulding cork flooring
NON RENEWABLE		

SUBJECTS
Social Studies
Mathematic

GRADES
K-9

PLT PRINCIPLE
2. Diversity of Forest Roles

CONCEPTS
2.111 Resource Needs for Human Dwellings
2.11 Need for Forest Products

SKILL
1. Gaining Information

BEST COPY AVAILABLE

(Continued)

The following chart can also be useful as a means for older students to address and organize information related to questions of function, durability, economics, aesthetics, and environmental impact of items used in home construction.

ITEMS USED IN HOME CONSTRUCTION

Item	Source	Price	Advantages	Disadvantages
Possible Substitute	Source	Price	Advantages	Disadvantages

EXTENSION

Ask your students as a class or in groups to design and build models of homes from the past, present, and future, possibly representing various cultures. If the students are not able to find and use the actual materials likely to be involved, ask them to simulate those materials as best they can and identify them accordingly.

Lesson 7

A Look at Lifestyles

88

OBJECTIVE

Students will be able to identify some of their own uses of wood products, suggesting ways they might appropriately change their own lifestyles to use this natural resource more effectively.

ACTIVITY

Ask your students to list the wood products they have used or consumed in the past 24 hours, identifying each product as (1) essential for survival, (2) necessary for maintenance of their present lifestyle, or (3) a luxury. This list can be made using words and/or images. For example, students can draw pictures of each of the products they have used in the past 24 hours, accompanying these with images or words identifying each of the natural resources from which the products are made.

After looking at the lists and discussing them, ask each student to propose alternatives for each item listed in categories two and three, making an effort to replace items which they believe are inefficient or wasteful. A master list of the resources used and the proposed alternatives can be created in the form of a display. Questions such as these might be discussed with the students:

Which, if any, items listed in the "essential" category are really not essential? What are your criteria for evaluating an item's necessity?

Which, if any, items listed in the second category are luxuries? On what basis do you judge an item a luxury?

What would be the environmental and economic impact of switching to your alternatives? Would it increase your use of renewable resources? (For example, switching from aluminum foil to cellophane food wrap would accomplish this.) Or, would it increase your use of nonrenewable resources? (Switching from paper cups to most plastic cups would have this effect.) How would changes in the production, and consumption of these products influence the use of energy? How might changes in the production and consumption of these products affect the economy?

Look at the list of luxury items. Which items could you give up without a major change in your lifestyle?

Make a list, beginning with the easiest item to give up and ending with the most difficult. Could you give up the top three items on this list for a day? A week? A month? Try it.

Think of several ways in which to reuse or recycle items you determine you could *not* give up, if any.

Identify the resulting economic, cultural, and environmental repercussions involved in any changes you make or recommend. Consider the implications if your entire family, school, community, and nation made such changes.

SUBJECT
Social Studies

GRADES
7-12

PLT PRINCIPLES
7. Lifestyles
5. Management and Interdependence of Natural Resources

CONCEPTS
7.1221 Conflicts in Consumption Patterns
7.3 Resource Depletion Prevention
5.12 Renewable Resources
5.121 Efficiency of Resource Use

SKILLS
VI. Valuing
V. Problem Solving

Lesson 8

89

Forest Consequences
(Mural Preparation)

SUBJECTS
Social Studies
Science

GRADES
4-6

PLT PRINCIPLES
7. Lifestyles
6. Life-Support Systems
5. Management and Interdependence of Natural Resources

CONCEPTS
7.123 Behavior Effects on Environment
6.31 Human-Biosphere Relations
5.5 Trade-offs
5.4 Values vs Uses

SKILLS
IV. Critical Thinking
VI. Valuing

OBJECTIVE

Students will demonstrate knowledge of the effects of human and nonhuman activity in forested areas.

ACTIVITY

Provide a large piece of butcher paper and help students create a mural on it representing a forest complete with wildlife and habitat but no human beings. The mural should be contoured to show locations of mountains and valleys.

Second, lead the class in a brainstorming session to list examples of human and nonhuman activity which might be introduced into the forest environment. Then, ask the students to make a set of pictures, one picture representing each item on their list. The list might include:

- Lumber mill in operation
- Roads in use
- Fences
- Beaver damming a stream
- Sewage plant
- Telephone and power lines
- Red fox hunting for food
- Tunnel
- Dam
- Reservoir
- Ski area in use
- Wilderness area
- Campfire
- Campground
- coyote hunting for food

When the pictures have all been made, ask each student, in turn, to pick a picture and choose a place on the mural where the picture could appropriately be tacked or pinned. Students may explain to the class why they selected their locations.

Lesson 9

Discussion and Elaboration of Consequences

OBJECTIVE: continuation of Lesson 8

ACTIVITY

After all the students have had a turn, ask each student to draw directly on the mural one or more possible consequences resulting from introducing into the forest the activity shown. If you prefer to save the original mural for other uses, the students can simply make pictures of these consequences, attaching these to the mural.

Sample consequences are a dangerous mudslide, forest fire, silting, soil erosion, human recreation, noise pollution, deer population explosion, dead fish, and injured animals. Discuss with the students both the possible beneficial and detrimental effects of these consequences.

After discussion the students can make posters celebrating particular activities in the forest they think are of long-term benefit and depicting solutions to some problems shown by the consequences. If there are no known solutions to some problems, discuss the ramifications of eliminating the disruptive activities from the forest, taking care to distinguish between human and nonhuman activities and the differences involved.

Who Runs This Place?

OBJECTIVE

Students will understand how land use decisions are made and by whom. (At this grade level teacher preparation and input will provide the basis for the lesson.)

ACTIVITY

Some changes that would improve environmental quality require changes in or additions to laws. To initiate these changes, citizens must know which officials have jurisdiction over what areas and the extent of their authority. This activity explores environmentally related laws and government authority at the local level.

With class discussion identify problems and questions which can be put to the visiting government official.

- Why don't we have more trees?
- Why don't we have more parks or open spaces?
- Why isn't paper being recycled?
- Does our community have a land-use plan?

PLT
S33

Official Visit

ACTIVITY

- questions and problems formulated by students in Lesson 10 directed to visiting official.

Some possible problems/questions might be:

1. Who is in charge (of planting more trees, establishing more parks or dealing with whatever the problem is?
2. What statute forms the basis for this person's authority?
3. What branch of community government administers the problem area?
4. What is the source of revenue for this government department? How and when are its funds budgeted?
5. In what ways is the department attempting to solve the problem? If no attempts are being made, why not?
6. Does a proposed solution to the problem require a change in a law or other regulation? If so, would the change be in municipal or county codes, standards, zoning regulations, or what?
7. How is the law or regulation changed?

Brainstorm with your students to produce a list of factors which might be involved in the improvement of residential environments. Factors mentioned could include zoning, sewage treatment, tree planting, remodeling homes.

1. Does our community have sufficient greenbelts?
2. Is there a housing shortage?
3. Is a comprehensive land-use plan needed?
4. Are sewage disposal and treatment facilities adequate?

Lesson 12

45

My Use or
Your Use or Our Use

OBJECTIVE

Students will be able, through their realization of the implications, to make a decision concerning the use of a plot of forested land.

SUBJECT
Social Studies

GRADES
5-6

PLT PRINCIPLES
4. Societal Perspectives on Issues
5. Management and Interdependence of Natural Resources
2. Diversity of Forest Roles
6. Life-Support Systems

CONCEPTS
4.1 Self-Role Perception
4.4 Variety in Use
5.1 Interdependence of Resources
5.4 Values vs Uses
5.5 Trade-offs
2.1 Forest Uses and Values
6.44 Land Selection for Forests

SKILLS
V. Problem Solving
IV. Critical Thinking
III. Social Participation

ACTIVITY

Choose a piece of forested land with which your students are familiar and which is located near your community. Present this hypothetical situation: The community has acquired this land because the owner has not paid the property taxes. The city council is uncertain whether to keep or sell the land. If council members decide to sell the land, they must also decide to whom it should be sold.

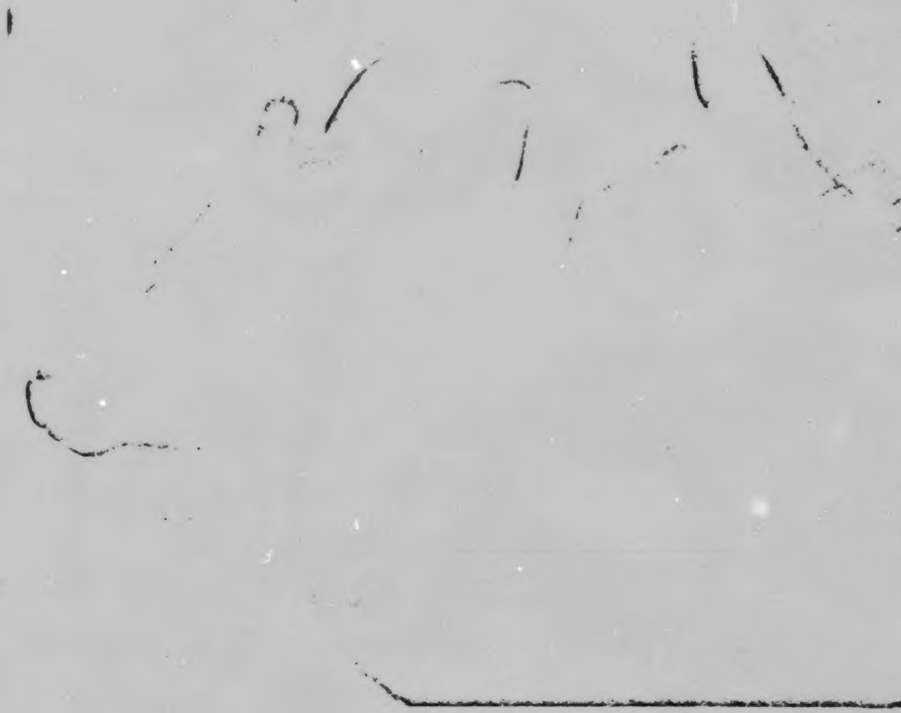
Depending on the size of your class, ask each individual student or group of students to assume one of a variety of possible roles:

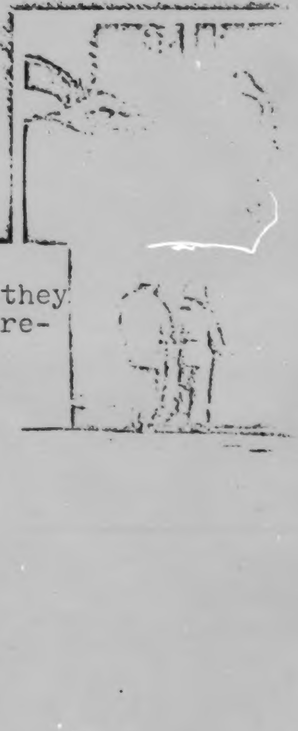
- Housing development contractor
- Realtor
- Wood products industry representative or tree farmer
- Recreation director
- Energy firm representative
- Mining firm representative
- Cattle rancher
- Conservation group representative
- Private businessperson
- Industry representative
- Golf course manager
- Homeowner
- Land speculator
- Grain farmer
- Government representatives for municipal, provincial, and federal levels

The exercise is often of most value to students if they can develop their own list. In any case, ask them to suggest additions to the list and select from any of those suggested.

45

(Continued)





Ask each individual or group to research the part they choose. Once the research is completed, each could prepare a written document stating the reasons the land should become his or hers. Points to consider in developing the position statements are:

The price each interest group is willing to pay.

For each interest group, the social, aesthetic, psychological, and ecological advantages of acquiring the land.

The long-range effects of each use on the land's productivity.

The economic advantages of each land use to the community. Are these advantages short-run or long-term?

Lesson 13

My Use or Your Use or Our Use

(continuation of Lesson 12)

Research and preparation for Lesson 14

Lesson 14

My Use or Your Use or Our Use (continued)

When all the statements are ready, ask each student or group to make an oral presentation before a mock city council of four to six students. The council, after hearing and considering all the testimony, should decide whether the land will be sold and if so to whom and at what price. Afterward, the class can question the council on the reasons for its decision. A general discussion by all class members should then be held to consider the implications of such a decision, and possible implications of those actions not taken.

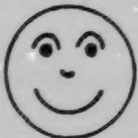
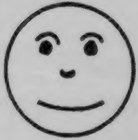
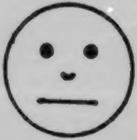
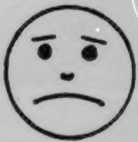
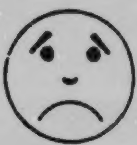
APPENDIX C

Affective and Achievement Tests

NAME: ____________________

GRADE: ________

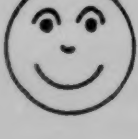
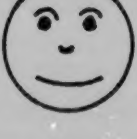
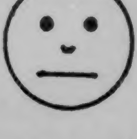
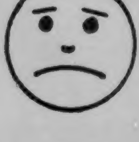
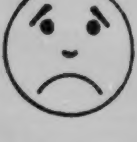
Today we are going look at some pictures of trees and forests. Instead of asking you questions about what you *know* or *remember*, I am going to ask you how you *feel* about each picture. There are no 'right' answers, and no 'wrong' answers. You will see a series of slides. Each slide has a title. Look at the picture carefully, and listen to the title. Then (and this is the really important part) decide how you feel about the picture -- look at the faces below:

To show how you feel about each of the pictures, you will draw a circle around the face that comes closest to your feelings. S, you must decide for yourself. You are not to talk to your classmates or to the teacher about your choices. If you have any questions, please ask them now.

You are going to see 40 pictures in all, but first, we'll try just one for practice. Look at the picture carefully, and listen to the title.

Which of the faces best matches the way the picture makes you feel? When you have decided, draw a circle around it.

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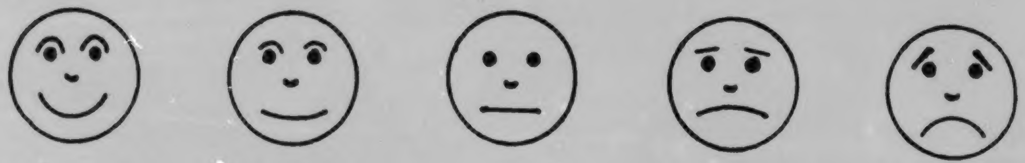

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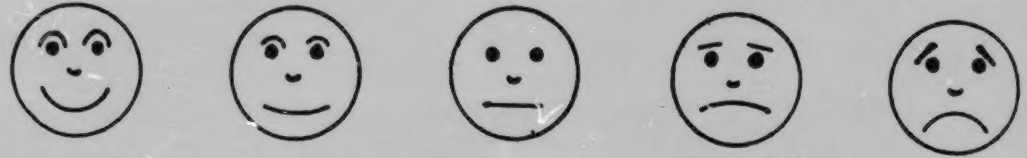

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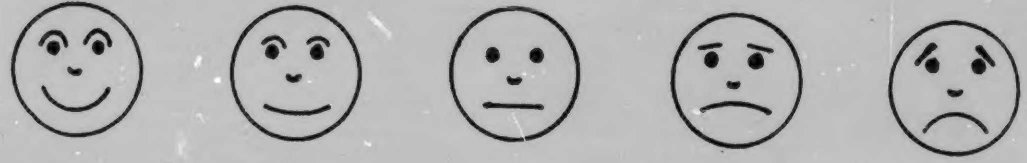

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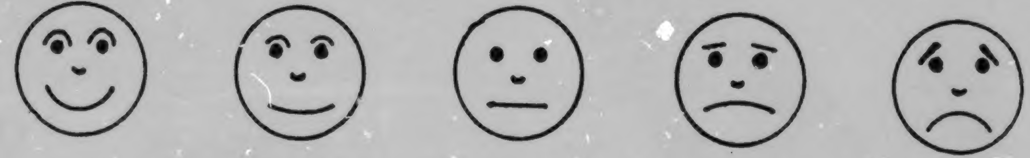

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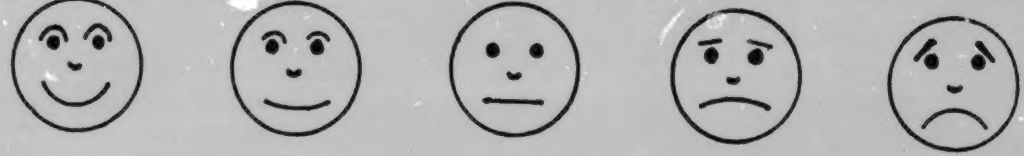

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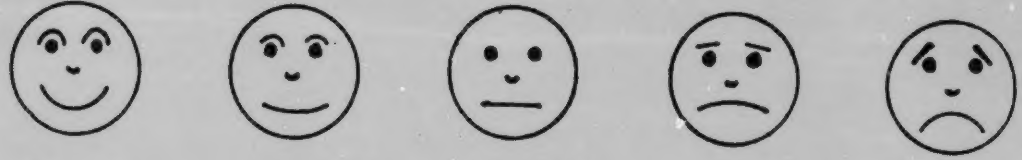

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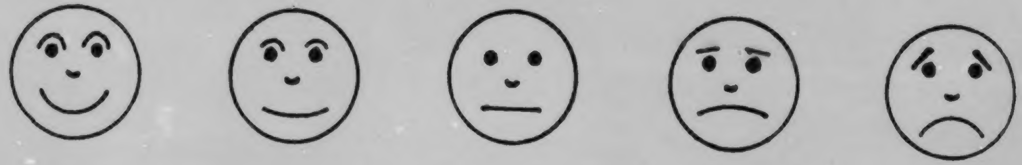

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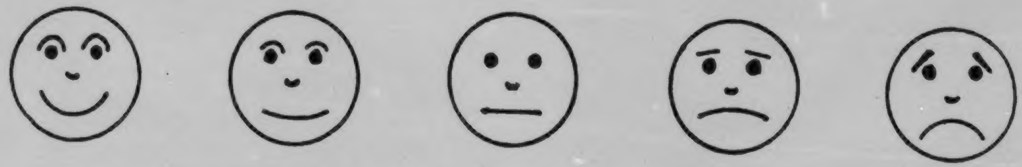

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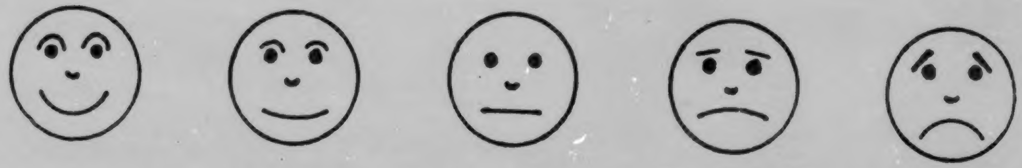

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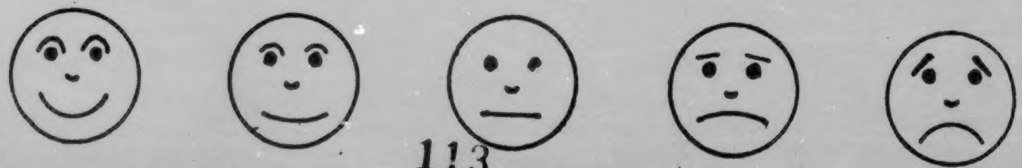


Name ______________________________

On the following pages, you will find a number of short accounts which deal with the use of our natural resources. Each account deals with a different problem or decision to be made. At the end of the passage four different suggestions are offered.

Your task is to read the passage carefully, consider the situation presented, and decide how much you agree or disagree with each of the alternatives. Then, circle the letter that tells how much you agree or disagree with that suggestion. You will use the following scale:

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

If you agree strongly with a statement, you will circle 'A'; if you agree, but don't feel particularly strongly about it, you will circle 'B'. If you disagree strongly, you will circle 'D', and if you disagree, but don't feel particularly strongly about it, circle 'C'.

It is important to remember that there are no 'right' or 'wrong' answers. You are being asked to state your feelings or opinions. It is very important that you answer each of the questions carefully and honestly.

Your teacher will go over the first page with you to make certain that you understand the directions.

A. Fifty miles from Gauge, B.C. there is a large lake with a forest stretching up the mountain side. Recently an exploration crew has discovered that there is a valuable mineral deposit near the lake. The mining company would like to construct a mine, a logging company wants to log the area. A government committee has investigated the area and the various proposals. The committee offers four alternatives to the Minister of Land and Resources.

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Allow the logging company to log it, then allow the mining company to put in their mine and to use the lake to dump their waste in.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Allow the logging company to log the land, but replant the forest.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Leave the land and the lake as they are.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Have the government develop recreational lots around the lake so the area will be used.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

B. There is a well-forested deep valley with a large river sixty miles away from any town. The Hydro Authority would like to build a large dam to generate electricity The power is needed for factories and cities along the coast. There are other groups who feel the area should not be flooded. Four groups appear before the Land Use Committee. Their positions are:

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Leave the land as it is. Do not touch it.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Build the power dam immediately without logging the forest.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Log the land, but replant as it is logged. Do not build a dam; create a park.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Log the land that will be flooded, then build the power dam.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

C. There is a square mile of timbered land about seven miles from a small city. Recently a logging company and a development company have both been trying to buy the land. The Area Land Use Committee must decide how this particular piece of land will be used. Four people express the feelings of the different groups.

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Develop a wildlife park in the area with nature trails and campgrounds.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Sell it to the developer. He can clear the timber and build a shopping mall.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Leave it as it is.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Let the logging company log it with the provision that they must replant the whole area.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

D. In the city of Harvan a pulp mill provides jobs for most of the people who live there. Recently a government committee investigated the company and discovered that the waste products are destroying the fish population in the nearby river and the Strait of Georgia. The owners of the pulp mill say they cannot afford to make the changes necessary to clean up their wastes. The union is afraid that the company will go out of business and hundreds of jobs will be lost. The local Rod and Gun Club and the commercial fishermen are demanding that the pollution be stopped.

There seem to be four possible lines of action for the government to take:

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Raise local taxes and provide some financial help to the company so it can clean up its operations and still stay in business.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Enforce the law which will require the company to clean up its waste disposal immediately even if it means closing the mill.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Waive the laws. Permit the company to continue as it is now.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Give the company several years to clean up its waste disposal systems.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

E. On the north side of town there is a piece of land approximately 2 km by 1 km. It is covered with heavy forest and has never been used. The owner died recently, and the cousin who inherited the property doesn't know what to do with it. Four of the local citizens have visited the new owner. Each one has a different idea of how the land can best be used.

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Sell the land to the town and we will build a wildlife and recreation park for the citizens to use.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Sell it to me and I will leave it as it is.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Sell the land to my development company. We will have it logged, then we'll use the land to develop a new housing subdivision.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Sell the land to my logging company and we will agree to log it, and replant the area to trees.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

F. In the town of Larksbreath, there are two vacant blocks that have been allowed to run wild for years. They are covered with small trees, weeds, junk, and wild brambles. The property beside these lots is used for small businesses. The garden club has come to the town council meeting asking that something be done about these eyesores. Four of the members of the council have four different solutions to the problem

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. There's no need to do anything.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. We should clear the lots and build a restuarant.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. We should clear the underbrush and weeds and build a nature walk through the trees. We could put in some picnic tables and a grassy area.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. We should clear the land and build a warehouse.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

G. A local logging company owns ten square miles of land along the coast. Many creeks flow across the area. The company is trying to decide what to do with the area. After a lot of discussion, four alternatives are still being considered.

Read each of the following statements carefully. Then circle the letter which indicates how you feel about the suggestion made.

1. Leave it as it is.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

2. Develop hiking trails and campgrounds.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

3. Log the land, burn the area off, and allow natural reseeding to take place.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

4. Selectively log out the largest trees and leave the smaller trees there to grow.

STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
A	B	C	D

GRADE 3 TEST

Name ______________________________

Introduction

Sherlock Hemlock and Arlene Arbutus, the world's greatest tree detectives, have too much work to do. Everyone seems to have questions about trees. Some people have even lost their trees, or had them kidnapped or stolen! Your job is to help Sherlock and Arlene, by answering the questions on the following pages. Do your best work. Sherlock and Arlene are counting on you!

Your teacher will read the questions in this booklet. Listen carefully, and do exactly what your teacher tells you. Sometimes you will have to circle an answer. Sometimes you will have to look at a picture and then write something. Please don't turn the pages until your teacher tells you to.

Instructions

Detectives get all kinds of jobs. Frieda Fir came to the tree detective office today with a list of questions. Sherlock and Celia are too busy, so you will have to be the tree expert, and find the right answers!

Listen carefully as your teacher reads each of the questions. Then pick the word that best answers the question. Draw a line under it.

EXAMPLE

What material is the trunk of a tree made of?

A. paper B. wood C. roots D. needles

NOW DO THE REST OF THESE BY YOURSELF.

1. Which branches on a tree are the thickest?

   A. top branches B. middle branches C. bottom branches

2. Where is the thinnest part of the tree trunk?

   A. top B. middle C. bottom

3. Which of the following is most dangerous to trees in a forest?

   A. fire B. wind C. rain D. wolves

4. Trees need lots of things to live and grow strong. Which one of these do all trees need?

   A. birds B. people C. water D. wind

5. Why do we learn about measures like metre and centimetre?

   A. so that we can do arithmetic

   B. so we know how big we are

   C. so people know which trees to cut down because they are too big

   D. so other people will know what we mean when we describe the size of something

6. What word means "the distance straight across" from one side of a tree trunk to the other?

   A. dormant B. height C. diameter D. circumference

7. What word means "the distance around" a tree trunk?

   A. dormant B. height C. diameter D. circumference

8. What time of the year do trees do most of their resting?

   A. spring B. summer C. fall D. winter

9. What part of the tree makes most of the food for the tree?

   A. trunk B. roots C. branches D. leaves

10. What do we call the covering of the tree trunk and branches?

    A. cones B. bark C. sap D. leaves

11. What part of the tree takes moisture from the soil?

    A. trunk B. roots C. sap D. leaves

12. If you put your hand into the touchy-feely box and found something that felt like a prickly ball, what might it be?

    A. cone B. branch C. root D. leaf

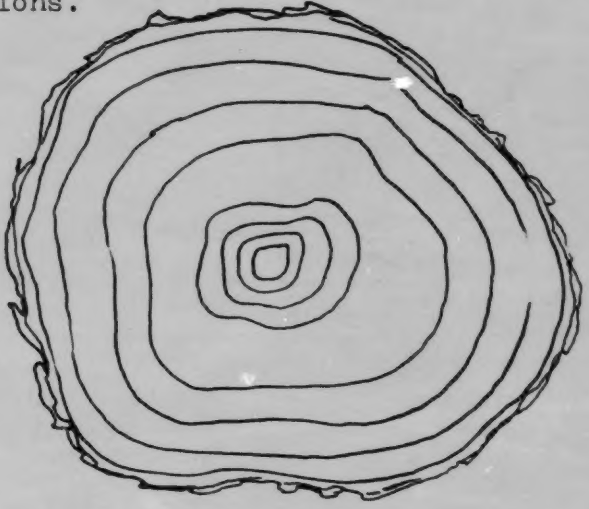
13. What do we call a tree that has needles for leaves?

    A. coniferous B. dormant C. deciduous D. cone

The Mystery of the Tree Cookie

Your next job is a tough one! Arlene Arbutus has a tree cookie, but she doesn't know how to read its code. You'll have to help.

Look carefully at the picture of the tree cookie. Then answer the questions.



14. How old was this part of the tree when it was cut down?

    A. 3 years B. 6 years C. 8 years D. 10 years

15. How old was this part of the tree in the year it did the most growing?

    A. 1 year B. 3 years C. 5 years D. 8 years

16. Why are some of the rings on the tree cookie thicker than others?

    A. Trees don't grow much after they are two years old.

    B. There is more snow, rain, and sunshine in some years than in others.

    C. In some years, birds build their nests in trees.

    D. Some years are windier than others.

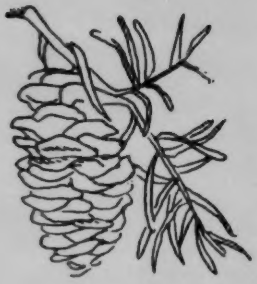
17. Draw a line on the tree cookie to show what it would look like if it had lived for one more year.

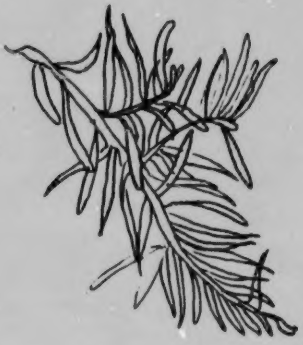
18. How many rings would you have if you were a tree? ________

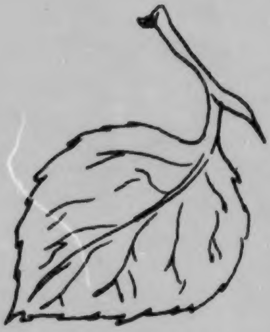
Mixed-up

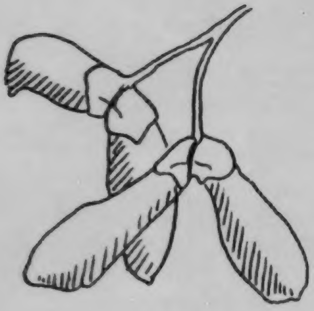
Sherlock and Arlene have another problem for you. They have two sets of pictures. One set has pictures of things that belong to DECIDUOUS trees. The other set has pictures of things that belong to CONIFEROUS trees. The problem is that the two sets have been mixed-up. Can you detect which pictures belong in the deciduous set and which pictures belong in the coniferous set? Some pictures might even belong to both sets!

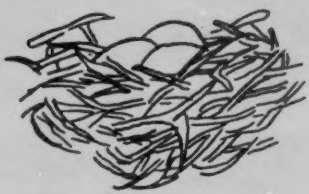
Look carefully at each picture. If it belongs to the deciduous set write "D" underneath it. If it belongs to the coniferous set, write "C" underneath it. If it could belong to both sets, write "B" underneath it.

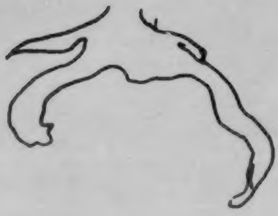






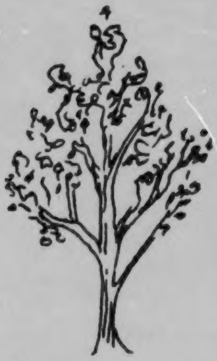


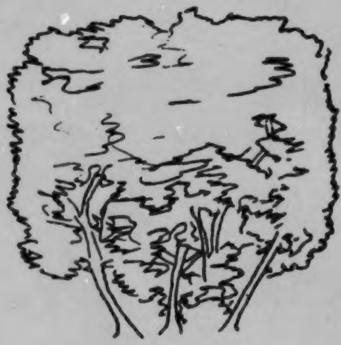


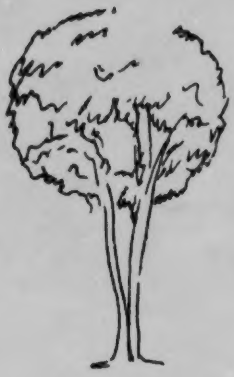


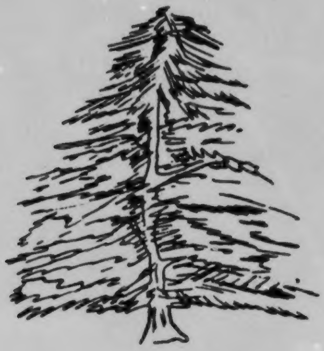
Hidden Shapes

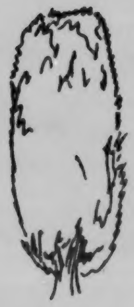
Your next job is to hunt for the shapes hidden in each of the trees below. Look carefully at each of the pictures. Try to decide what shape you can see: a square, a circle, a triangle or a rectangle. Then write the name of the shape under the picture.

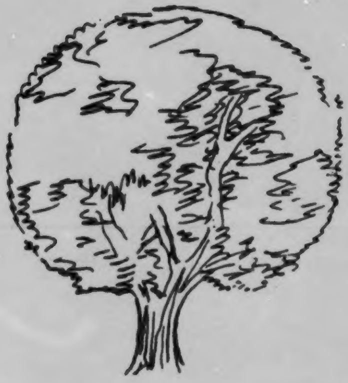












Dead or Alive?

Your next job is to help Sherlock detect whether George's apple tree is dead or alive. Read the following statements carefully. If the statement tells us something that shows that a tree is ALIVE write "YES" in the blank. If not, write "NO" in the blank.

__________ The tree is made of wood.

__________ The leaves on the tree are green.

__________ The tree has apples.

__________ The tree is very big.

__________ The tree has a lot of roots.

__________ The branches on the tree bend, but they don't break easily.

__________ The tree has blossoms.

The Case of the Trembling Tree

Martha is a beautiful maple tree. She has a list of things. Some of them HELP trees. Others HURT trees. She's afraid people won't know which are which. Arlene Arbutus wants you to help her.

Read each of the statements. If a statement tells about something that will help a tree grow strong and stay healthy, write "HELP" in the blank beside it. If the statement tells something that will hurt a tree, write "HURT" beside it.

__________ beavers

__________ crows

__________ gentle rain

__________ people carving initials

__________ floods

__________ sun

GRADE 5 TEST

Name ______________________________

I. Kinds of soil.

Each of the statements below tells about one type of soil. Write the name of the soil in the space after each statement. You may use each name more than one.

sand   clay   silt   loam

1. The first soil particles to settle in a jar of water ______________
2. Mostly made up of organic material such as dead leaves ______________
3. Water passes most quickly through ______________
4. Feels slippery when wet ______________
5. Made up of granules of minerals ______________
6. Sticks together in clumps in a jar of water ______________
7. Best for most gardens ______________

II. Read each of the following statements carefully. Decide which of the choices best completes the statement, and underline it.

EXAMPLE:

Tree trunks are made of

A. stone

B. cement

C. wood

D. grass

8. When plant leaves that normally get a lot of sunlight have the sunlight blocked, they

A. turn yellow-green.

B. turn darker green.

C. lose their veins.

D. dry up.

9. Compared to plants in the middle of your school's playing field, plants at the edges of the field would usually be

A. taller.

B. shorter.

C. about the same size.

10. Compared with plants in the middle of a park playing field, plants along the fences would be

A. more dense.

B. less dense.

C. about the same density.

11. The size of soil particles is important to the growth of plants because

A. it affects the insect life.

B. large particles get in the way of root growth.

C. it affects how well the soil holds water.

D. it affects the amount of carbohydrates.

12. What does the term 'natural succession' refer to?

A. The way that natural resources--such as trees--are made into products we use.

B. The way that communities change, such as a bare field grows into a forest.

C. The way that governments decide who is responsible for looking after our natural resources.

13. Division 6, which has 30 students, used 150 grams of paper yesterday. Division 7 which has 20 students used 140 grams of paper. Which class used more paper per student?

A. Division 6

B. Division 7

C. They both used the same.

14. If a class of 30 students uses 80 grams of paper per student per day, how many grams of paper does the whole class use in one day?

A. 110 grams

B. 240 grams

C. 2400 grams

D. 50 grams

15. If a student uses 20 grams of paper per day, how much paper would he use in a school week from Monday to Friday?

A. 20 grams

B. 100 grams

C. 140 grams

C. 200 grams

16. Which of the following characteristics would be least helpful in identifying the kind of tree?

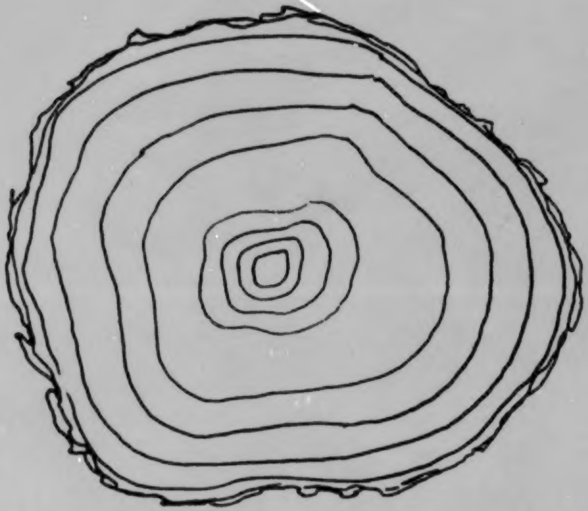
A. leaf shape

B. age

C. bark characteristics

D. tree shape

III. Look carefully at the tree cookie below.



17. How old was this part of the tree when it was cut down?

    A. 1 year B. 3 years C. 5 years D. 8 years

18. How old was this part of the tree in the year when it did the most growing?

    A. 1 year B. 3 years C. 5 years D. 8 years

19. Why are some of the rings on the tree cookie thicker than others?

    A. Trees don't grow much after they are two years old.

    B. There is more snow, rain and sunshine in some years than others.

    C. Some years are windier than others.

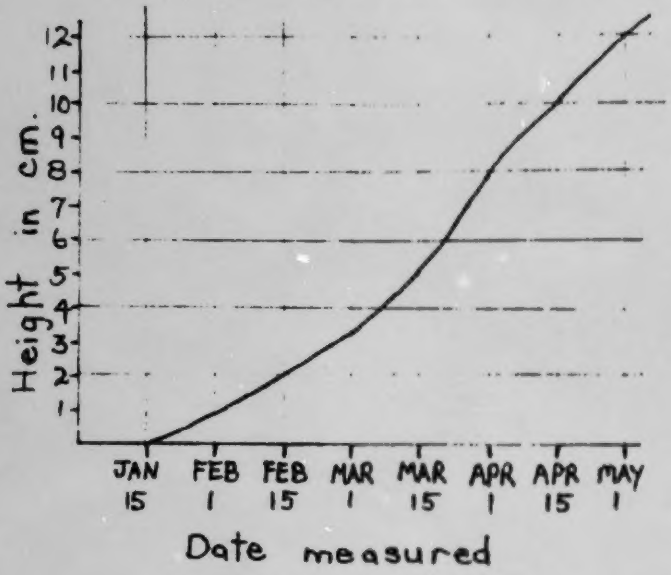
    D. Some years more birds build their nests in trees.

20. Draw a line on the tree cookie to show what it would look like if it had lived for one more year.

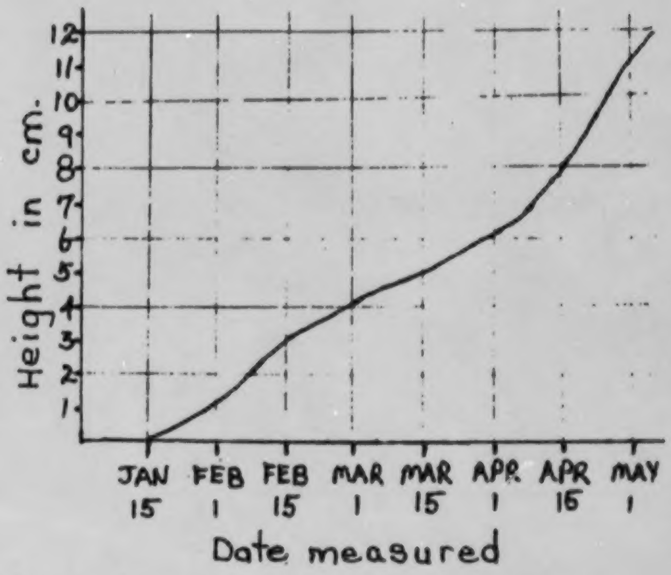
21. How many rings would you have if you were a tree? __________

IV. Look at the growth graphs below carefully.

PLANT A



PLANT B



Answer the following questions about the plants whose growth is shown in the two graphs above.

22. How tall was Plant A on March 1st?

A. 1 cm

B. 3 cm

C. 5 cm

D. 7 cm

23. Which plant grew the most between February 1 and February 15?

A. Plant A

B. Plant B

C. They grew the same amount.

24. Which plant was taller on May 1?

A. Plant A

B. Plant B

C. They were the same height

25. How tall was Plant B on May 1?

A. 2 cm

B. 5 cm

C. 8 cm

D. 11 cm

V . True-False. Read each of the following statements carefully. If it is true, circle true; if it is false, circle false.

26. You can identify tree species by looking at the bark. True False

27. A fir needle is a type of leaf. True False

28. All plants need the same amount of sunlight. True False

29. All living trees have bark. True False

30. Leaves of similar size have similar shapes. True False

31. Once a leaf has fallen it is of no use to the tree. True False

VI . List 5 pieces of recreational equipment made from forest products.

1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________
5. ________________________________

VII For each of the following products, circle "R" if it is made from a renewable resource or "U" if it is made from a nonrenewable resource.

newspaper	R	U
wool carpet	R	U
kitchen stove	R	U
nails	R	U
plywood	R	U
glass	R	U
aluminum siding	R	U
lumber	R	U
books	R	U
bricks	R	U

VIII Study the following picture carefully.

Circle 3 people who are doing things that might damage the outdoors. In the spaces below, tell why each is a bad thing to do.

1. ____

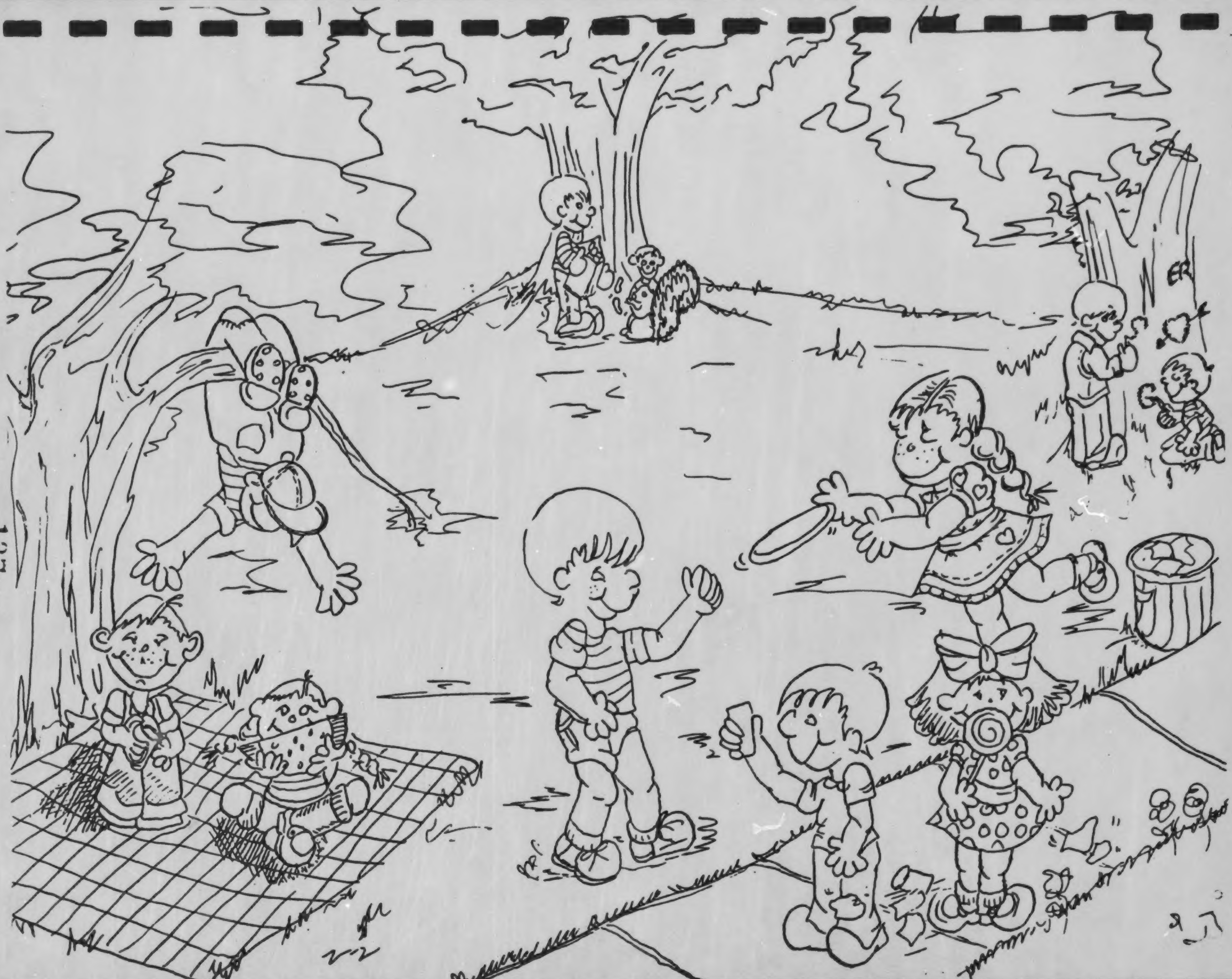
____

2. ____

____

3. ____

____


ER

IX List four things you could do to help save natural resources in your classroom.

1. ____

____

2. ____

____

3. ____

____

4. ____

____

X Whenever we do anything to a piece of land, both good and bad things can happen. Below are some things we could do. For each of these, write one good result and one bad result.

A. Making a piece of land into a park.

Good Result: ________________________________

Bad Result: ________________________________

B. Logging a piece of land.

Good Result: ________________________________

Bad Result: ________________________________

C. Building a road through a forest.

Good Result: ________________________________

Bad Result: ________________________________

GRADE 7 TEST

NAME ______________________________

TRUE-FALSE: Read each of the following sentences carefully. Decide whether each sentence is true or false. Circle "T" for "true" or "F" for "false" in front of each sentence.

T F 1. All trees can be profitably used for lumber.

T F 2. It is more expensive to buy land used for houses than land used for growing trees.

T F 3. Preservation and conservation mean the same thing.

T F 4. Trees help prevent water from eroding the earth.

T F 5. Logging an area of land makes that land useless for anything else for a long time.

T F 6. British Columbia has so many trees that it is not necessary to control logging and lumber companies.

T F 7. Everyone who hunts wildlife in British Columbia must pay a licence fee.

T F 8. A person who owns a piece of land is allowed to do whatever he wants with it.

T F 9. Fish can live just as well in a muddy stream as in a clear stream.

T F 10. There are no camping fees in British Columbia's parks.

T F 11. Logging can sometimes be good for a forest.

T F 12. Once a tree is planted in British Columbia it takes about 15 years to grow big enough to make into lumber.

T F 13. Iron ore is a renewable resource.

T F 14. A fir tree is more valuable for lumber than a birch tree of the same size.

T F 15. Most paper can be remade into more paper.

T F 16. Sometimes, logging a piece of land can be good for wildlife.

T F 17. Trees don't die of old age.

T F 18. According to the law, anyone who wants to use any park can do so whenever they want.

T F 19. Forests are valuable for more than just the lumber or paper they produce.

T F 20. A forest that is not logged has no value in our economy.

MULTIPLE CHOICE: For each of the following questions, circle the LETTER in front of the answer which you feel is most correct.

21. Which of the following is not made from a renewable resource?

a. cellophane
b. newspaper
c. gasoline
d. lumber

22. Most of the land in British Columbia is owned by

a. the lumber companies
b. individual people
c. the railroad companies
d. the government

23. Most of the money for buying and running parks comes from

a. private donations
b. camping fees
c. taxes
d. hunting licences

24. The measure of rainfall most often used in the forest industry is

a. cubic metres per hectare
b. gallons per acre
c. inches per year
d. litres per foot

25. How many cubic metres does a timber contain if it measures ½m by 1m by 20m?

a. 10
b. 20
c. 100
d. 200

26. In order to survive, humans need

  a. plants
  b. schools
  c. transportation
  d. all of the above

27. If a log measures 1m in diameter and is 4m long, about how much is it worth as lumber?

  a. $ 4.00
  b. $ 40.00
  c. $ 400.00
  d. $4000.00

28. A watershed is

  a. one of the main causes of erosion.
  b. a forest area that collects rainfall.
  c. a spawning place for salmon.
  d. a reservoir made of wood.

RENEWABLE OR NONRENEWABLE RESOURCES: Look at each of the following products. If the product is made from a renewable resource write an "R" in the blank beside it. If it is made from a nonrenewable resource, write an "N" in the blank.

_____ Oil base paint

_____ Wool underwear

_____ Asphalt shingles

_____ Plywood

_____ Bricks

_____ Plastic water pipes

_____ Turpentine

_____ Books

_____ Paper cups

_____ Kitchen stove

_____ Bamboo drapes

_____ Nylon carpet

_____ Glass windows

_____ Bathroom toilet

_____ Cedar siding

_____ Lumber

WANTS AND NEEDS: In order for humans to survive in British Columbia, we NEED some things. Other things we don't really need, but we WANT them in order to be comfortable. Look at the list below. If the item is a NEED write an "N" in the space beside it. If it is a WANT (but not a NEED) write a "W" in the space.

_____ Clothes

_____ Air

_____ Rain

_____ Books

_____ Water

_____ Movies

_____ Fruit juice

_____ Protein

_____ Bread

_____ Shelter

_____ Meat to eat

_____ Cars

_____ Television sets

_____ Plants

FOREST CONSEQUENCES: Whenever we decide to do anything to a piece of land good things and bad things can happen because of what we have done. Below there are five things we could do. For each use below write two good results and two bad results.

A. Building a dam on a river.

GOOD 1. ____________________

2. ____________________

BAD 1. ____________________

2. ____________________

B. Making a piece of land into a park.

GOOD 1. ____________________

2. ____________________

BAD 1. ____________________

2. ____________________

C. Logging a section of forest.

GOOD 1. ____________________

2. ____________________

BAD 1. ____________________

2. ____________________

D. Building a road through a forest.

GOOD 1. ____________________

2. ____________________

BAD 1. ____________________

2. ____________________

E. Developing a mine.

GOOD 1. ______________________________

2. ______________________________

BAD 1. ______________________________

2. ______________________________

USES FOR TREES: Trees which are still living improve the quality of our lives in many ways. List FIVE ways in which trees which have not been cut down or turned into wood products are of value to us. (The first one is filled in as an example.)

0. They are beautiful.

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

5. ______________________________

APPENDIX D

Supplementary Field Trip Materials for District 2, Treatment B, Grade Seven

JAMES PARK ELEMENTARY SCHOOL

Year 7 Students

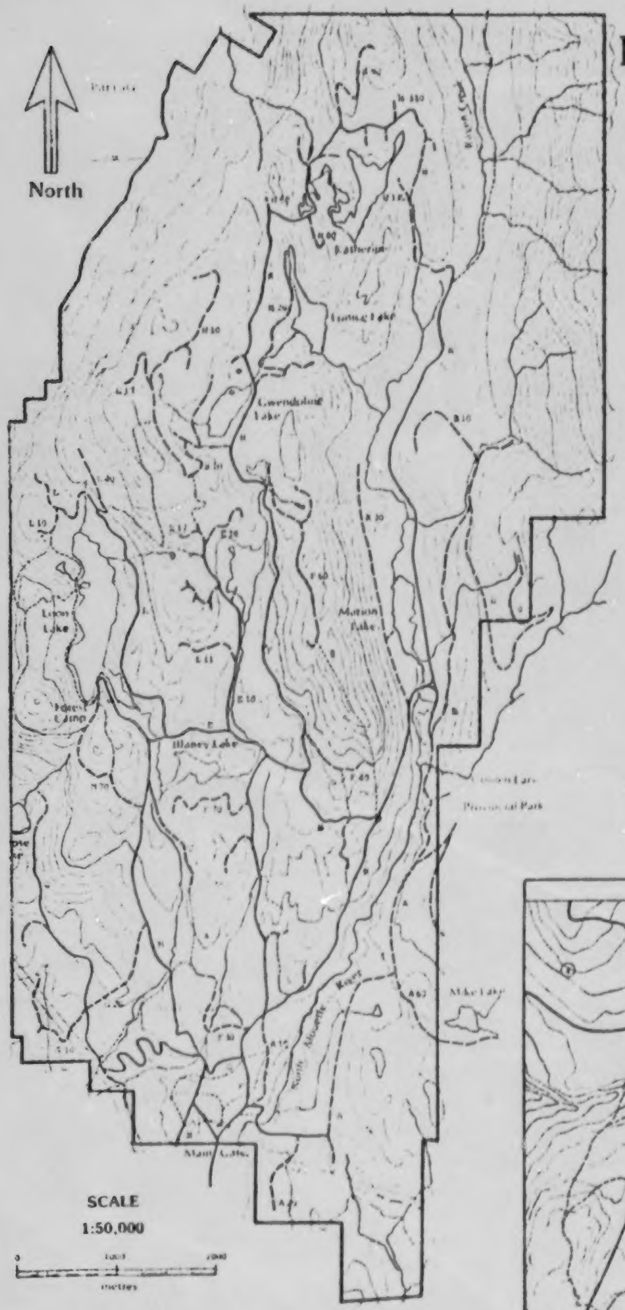
Name: ____________________

Field Trip to U.B.C. Research Forest - Thursday, 19 June 1980

1. 9:00 - Attendance in your classrooms.
2. 9:15 - Leave for the Research Forest.
3. 9:50 - Arrive at the Research Forest. Assemble at the Donkey Engine with your lunches and clipboards.
4. 10:00 - Introductions (Janice, Steven, Joan).
5. 10:10 - Three separate walking tours. UBC technician to lead; classroom teacher to maintain the 'rear command'.
    a) On the road, keep to the RIGHT as you face the traffic. (Logging trucks travel the roadway.)
    b) All students MUST know their classroom registration number.
    c) Stay ON the trails.
    d) No talking when the technicians and/or the teachers are speaking, and
    e) No picking of anything.
6. 12:00 - Lunch at the Donkey Engine. Each class is responsible to clean up their garbage.
7. 12:40 - Station work:
    a) Spotter. Assemble at the Arboretum. (Pencil & clipboard) Test on specimens (answer sheet attached). Mrs. Planidin's class.
    b) Hectare Plot. Assemble north of the Donkey Engine (up road F). Mrs. Broughton's class.
    c) Cultural Landscape. Northwest across Anderson Creek to Station C. Mr. Ponsart's class.

    (Move to second station @ 1:15; to the third @ 1:45)
8. 2:15 - Assemble in the parking lot.
9. 2:20 - Buses leave for James Park School.

STUDENT MATERIALS: "MUST" -- pen/pencil, bag lunch, clipboard, paper
PERMISSIBLE -- cameras



THE UNIVERSITY OF BRITISH COLUMBIA

RESEARCH FOREST

MAPLE RIDGE, B.C.

Director Professor J. Walters, R.P.F.
Address U.B.C. Research Forest
R.R. 2
Maple Ridge, B.C.
V2X 7E7
Phone 463-8148

WELCOME TO THE RESEARCH FOREST

This experimental forest is dedicated to research, education and demonstration in the forest sciences.

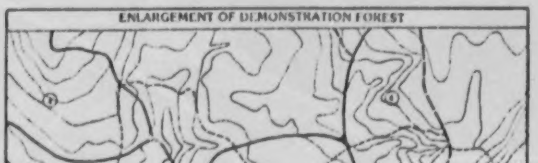
You are invited to walk around the Forest — no vehicles, horses, or bicycles are permitted. We ask that you respect the prime function of the Forest and do not tamper with research installations.

- *No fishing or hunting is allowed because of research projects concerning stream ecology and wildlife*
- *Dogs are not permitted as they hinder research into blacktail deer*
- *We do not allow camping or fires, our neighbour to the east, the Golden Ears Provincial Park, provides these facilities*
- *The Forest Camp at the south end of Loon Lake is closed to the public. Please stay out of this area*

PLEASE TAKE YOUR LITTER HOME WITH YOU

Legend

main road
branch road
building
trail
contours at 100' intervals
restricted area (no public access)
powerline



POINTS OF INTEREST

Forest Headquarters ①
Weather Station ②
Steam Donkey Engine ③
Research Plantations ④
Waterfalls ⑤
⑥ Parking Lot
⑦ Deer Pen
⑧ Arboretum
⑨ Viewpoint
Trail

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Research on the Forest is carried out by U.B.C., Simon Fraser University, and the Federal and Provincial Governments. Over 350 research projects have been initiated on the Forest. There are currently some 100 projects underway, many of a long term nature. Much of the research work has received international recognition for contributions to science. Research includes many aspects of the forest sciences including fish and deer biology, lake and stream ecology, soil studies, small mammal ecology, microclimatology, forest genetics, forest regeneration, forest productivity, tree pathology, tree measurements, tree physiology, forest ecology, and forest hydrology.

The Reforester, a tree planting machine developed at the Research Forest

Education

The Forest serves as a training ground for U.B.C. forestry students. They visit the Forest as part of their course work and attend a three-week camp, at Loon Lake, at the end of their third year of Forestry. These field courses incorporate many aspects of practical forest management. Forestry students from other institutions such as B.C.I.T., B.C. Forest Service and Selkirk College also visit and make extensive use of the Forest as an outdoor classroom, as do students of biology, zoology, geography, geology, and soils from various schools and colleges.

The Outdoor Education Programme is conducted by the Research Forest as a service to schools of the Province. About 5500 school children and teachers visited the Forest during 1976. Over half of these stayed at the Loon Lake Camp for up to a week of residential outdoor education. A large area of the Forest, surrounding Loon and Blaney Lakes, has been set aside as an education reserve within the Research Forest Management Plan.

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Forest Management

Between 1949 and 1978 a further 1022 ha of mature forest have been harvested. The cutting has been done as part of the regular management of the area and the revenues from the timber largely pay for the day-to-day running of the Research Forest.

To ensure that the Forest will produce wood in perpetuity, the land is managed on a Sustained Yield basis, whereby only the quantity of timber that is grown over a certain period of time is removed during that period. About 11,300 cubic metres of wood grow annually on the Forest and this amount, called the "annual allowable cut" is harvested each year from about 35 ha of land. The calculation of the amount to be harvested is based on site index, a measure of wood productivity, which varies considerably over the different parts of the Forest. The Forest Reserves, which are areas of special ecological or educational significance, and protection forest, are not included in the calculation of the AAC.

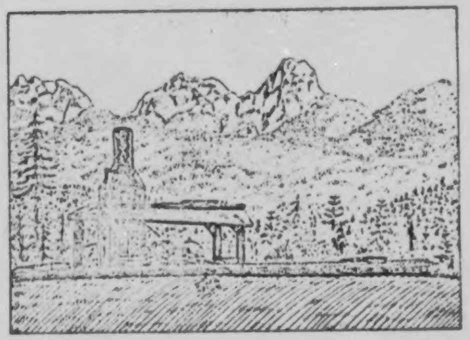
After logging, the Forest is regenerated either naturally or by planting selected young trees (usually Douglas fir). The Research Forest has a large area of thrifty plantations dating back to 1952.

A forest is a complex resource capable of supplying a variety of products and services. Water production, timber production, recreation, nature reserves, and education reserves are some uses of a forest which are regarded as best fulfilling the needs of society. The Forest is thus zoned into areas for these uses so that each zone is put to the use it is best able to fulfil (see the display at the entrance to the Forest). The management policy demonstrated at the Research Forest is termed a policy of "Best-Use".

A detailed Management Plan ensures collation of all the basic resource data and the application of this information to fulfil the Management Objectives of the Forest. Management developments proposed at the Research Forest are the implementation of intensive timber production and a demonstration forest for the general public.

THE RESEARCH FOREST

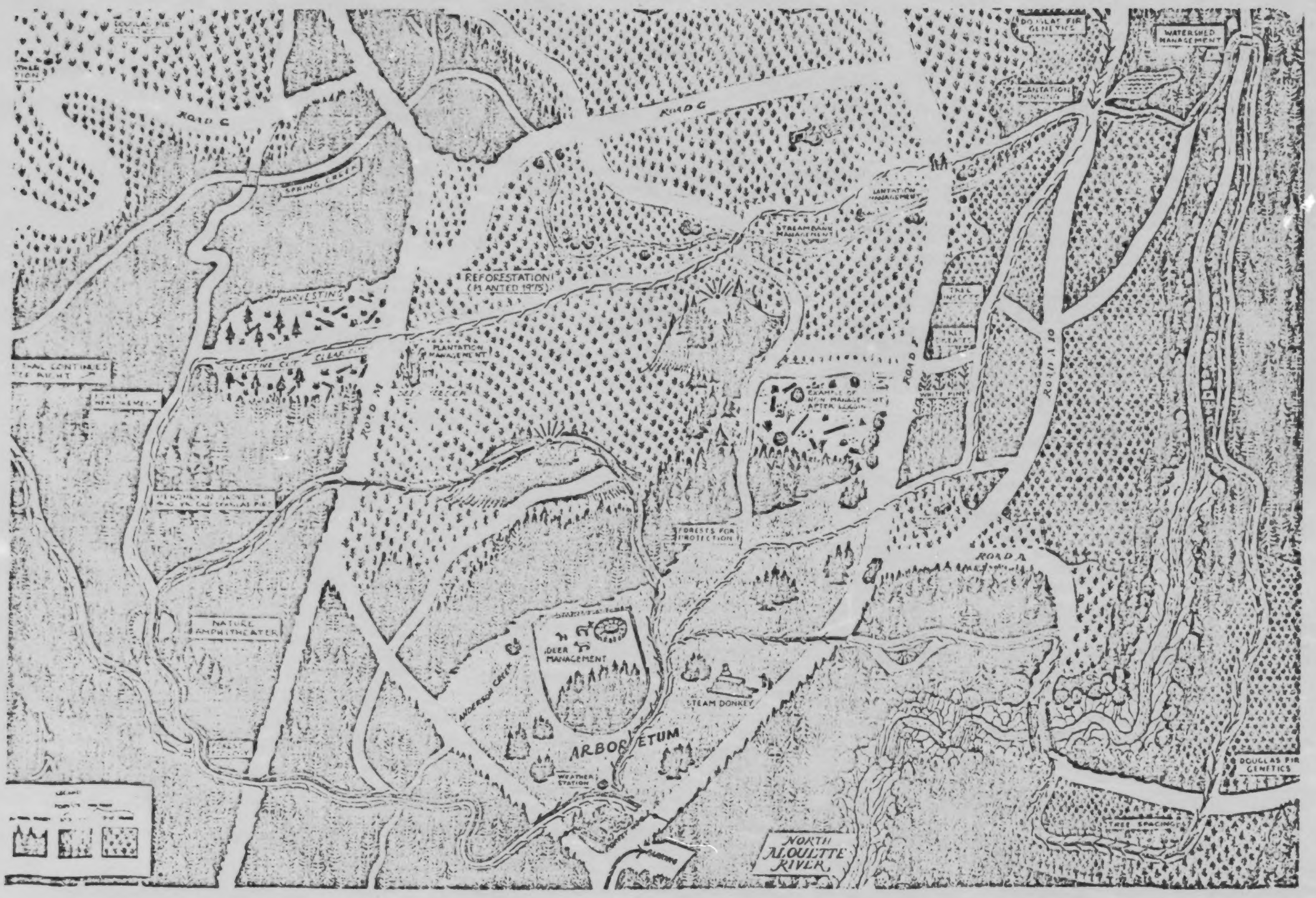
UNIVERSITY OF BRITISH COLUMBIA



This 5157 hectare forest was established in 1949 as a facility for demonstration and instruction in the practice of forestry. It is managed by the U.B.C. Faculty of Forestry to provide an optimal environment for research, education, and demonstration in all aspects of the forest sciences.

The area is typical lower coast topography — mountain lakes, steep slopes and rock outcrops in the north, and more gentle slopes of glacial till in the south. Elevations in the Forest range from sea level at Pitt Lake to 1025 metres on the slopes of Mount Blanchard. There are six major lakes in the area and numerous small ones. Loon Lake, the largest, is 1600 m long and 500 m wide. The north fork of the Alouette River and Blaney Creek drain the greater part of the Forest.

Forests of old growth Douglas fir, western hemlock and western redcedar originally dominated the Forest. However, in 1868 a large fire started by settlers in Maple Ridge burned about 1200 ha of what became the Research Forest. This area now supports 100-year stands of conifers which have naturally regenerated on the site of the fire. Nearly 2800 ha of large virgin timber were harvested between 1924 and 1931 by one of the largest railway logging operations in the Pacific Northwest. Thus by the time the Research Forest was granted, much of the area was second growth.



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JAMES PARK ELEMENTARY SCHOOL

____
Name

CULTURAL LANDSCAPE SIMULATION

A LAND-USE CONTROVERSY

A. Location

The 40 hectares of undeveloped forest land is located close to the high density population area of the Lower Fraser Valley. It has a rich and varied abundance of plant and animal life and is noted as a nesting area for the Blue Heron. It is a haven for bird watchers, ecology groups, scientific researchers, tourists and the local people who enjoy leisurely walks in the forest.

A controversy has arisen in the district over the proposals for two alternative uses for the area. The Dayoff Land Development Company believes that in view of the rising population coupled with the housing shortage, the community would be best served if the land were used for the construction of new houses, condominiums and apartments.

At the same time, however, the sports and athletic interests represented by the Athletic Association believe that the land should be used to improve sports facilities. They want to see the construction of track and field facilities, a sports stadium, a swimming pool, a skating rink, a curling rink, and twelve tennis courts. They wish to develop a true country sports complex. Their aims obviously conflict with those of the land development company.

A third group interested in the area is the Society for Ecological Protection. They, of course, are concerned that anyone wants to do anything to the land and they strongly oppose the interests of both the above groups.

The use of the land is to be decided by a five member council which will be elected during the course of this simulated exercise.

B. Procedure

1. Introduce the simulation exercise.
2. Select 6 pupils to act as independent candidates (2 per class) in the coming election.
3. The parties:
   a) The Dayoff Land Company ....Mrs. Broughton
   b) The Athletic Association ....Mr. Ponsart
   c) The Society for Ecological Protection....Mrs. Planidin
4. Each group:
   a) select two election candidates,
   b) select a chairperson to run your campaign and later to submit your argument to the council,
   c) prepare a brief which outlines as strongly as possible support for your position,
   d) brainstorm/aid your chairperson and election candidate in preparing his speech for the all-candidates meeting.
5. Each independent candidate:
   a) prepare an election statement,
   b) begin lobbying with interest groups to obtain votes,
   c) select one student to act as a chairperson.

C. To Win This Simulation Exercise

1. To win, you must get elected to the council. You must therefore ensure that you are supported by one or more of the groups.
2. You must prepare a convincing election statement to be delivered at the all-candidates meeting. See the sample "Position Paper" for your group

D. Field Trip

1. At school (before the trip):
   a) examine the map of the area. Determine the best place for roads and the features that you wish to develop. (Use onion skin over top of the pictorial map.),
   b) identify the natural setting (plants, trees, animal life) that you wish to retain. Divide your class into groups to cover a specific area to determine unknown features of the land,
   c) decide how you can best use the information that you collect on the field trip.

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D. Field Trip (con't)

2. On the field trip:
   a) divide into three groups to investigate a selected area of the forest as follows:
      i) Group A - (Registration #1 - #11).
         The rock mound area.
      ii) Group B - (Registration #12 - #21)
         The new forest area
      iii) Group C - (Registration #22 - #32+)
         The fertile plot and the mature forest.
   b) answer the following for your area:
      i) How can you best use this area to suit your topic? What is in this forested land? (Lumber value, watershed value, wildlife value, recreational value, forage value.) Find another way to measure value.
      ii) How would your proposal influence land values?
      iii) Name items under the following headings that would be compatible with your proposals:
         - personal use (such as fishing, hunting)
         - commercial use (such as logging, mining)
         - community value (such as wildlife habitat, aesthetics)
         - interest groups (such as motorcycle clubs, environmental groups)
      iv) What type of activities would conflict with your topic? How could you solve this conflict problem?
      v) What things must be preserved? What things would be destroyed?
      vi) What things must be conserved?
      vii) Under what circumstances might people be prevented from entering and using the area under your proposal?
      viii) Are there any possible natural hazards in your area? (Such as tall diseased trees, boggy soil)
      ix) Try to think of laws that would need to be passed to make your proposal permanent. (Such as the Greenbelt Law to preserve the existing size of land parcels)
      x) What departments of the government could help you succeed at your proposal? How?
      xi) Are sewage disposal and treatment facilities and a source of good water a problem for your proposal? What power needs are required?

3. At the school (after the trip):
   a) Discuss the answer to the above questions.
   b) Use the answers to the above questions to develop a convincing arguement for your presentation to the council.

E. All-Candidates Meeting:

1. Conduct the all-candidates meeting for all students. Each candidate delivers a prepared statement of his position.
2. Question period. Audience questions candidates.
3. Review voting procedure. (Order of preference.)
4. Conduct the election for the council. (5 members)

F. Council Meeting:

1. Council selects a chairperson.
2. Begin with the presentations of the brief by the chairperson from each interest group and ONE independent. (Rep)
3. The council then votes on the proposal of the Dayoff Land Development Company. If they accept the proposal, this group wins the exercise and the exercise is at an end. However, if the council defeats the proposal, the exercise continues.
4. The council next votes on the proposal of the Athletic Association. Result is as above.
5. The council then votes on the proposal of the Independent group. Result: If this proposal is defeated, then the Society for Ecological Protection wins the exercise.

(ADAPTED FROM: "STREET RHYTHMS:" OXFORD, DAVID & HUMPHREYS.)

U.B.C. Research Forest
Field Trip

Spotter Station

JAMES PARK SCHOOL

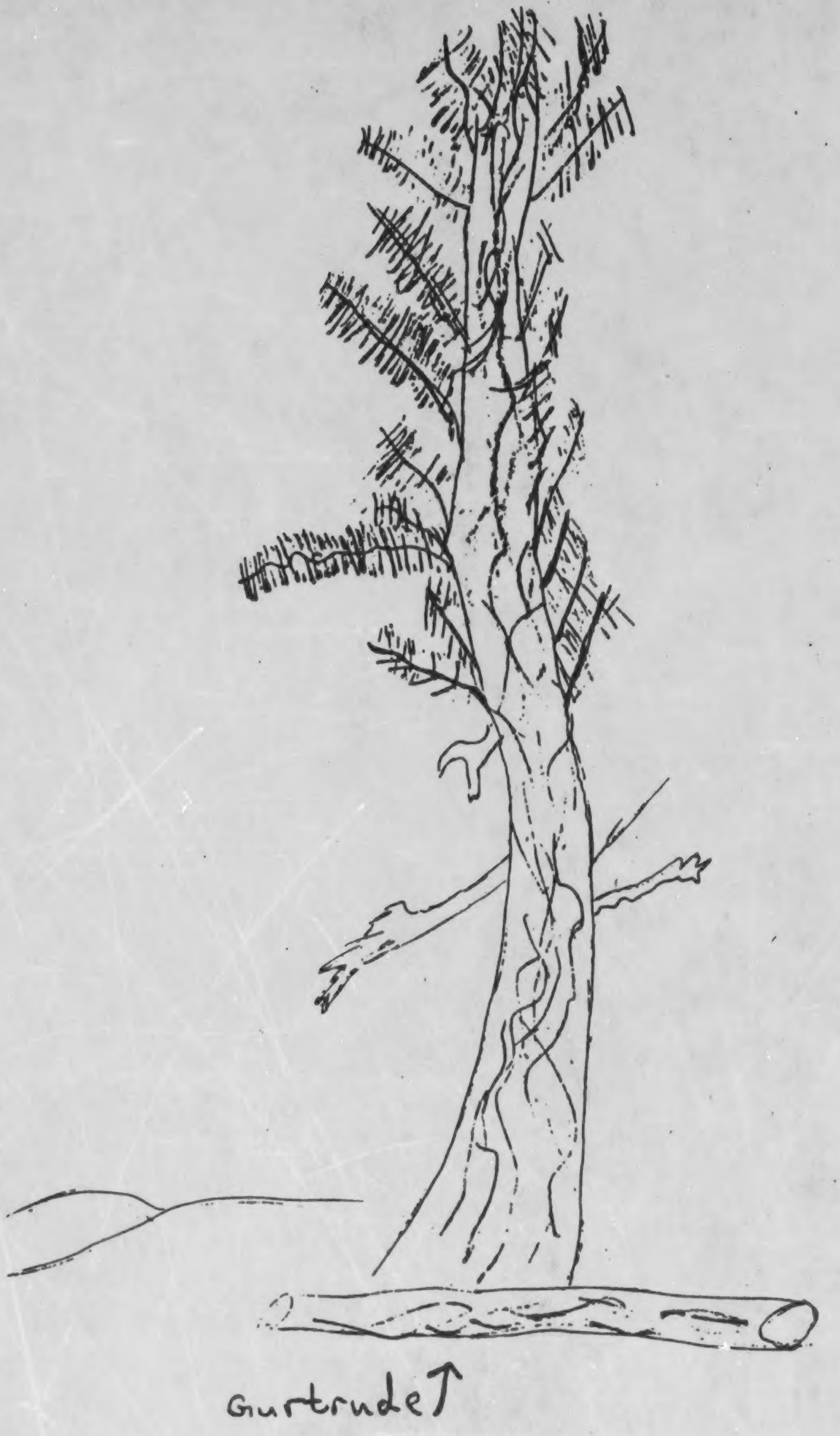
Name: ______________________ **Date:** ______________________

ANSWER SHEET

1. Douglas-fir - bark
2. Douglas-fir - foliage
3. Hemlock - Bark
4. Hemlock-foliage
5. Cedar - bark
6. Cedar-foliage
7. Vine Maple
8. Broad Leaf Maple
9. White Pine
10. Spruce
11. Flowers - Male
12. Flowers - Female
13. Devil's Club
14. Skunk Cabbage
15. Salal
16. Sword Fern
17. Deer Fern
18. Bunch berry
19. Alder
20. Cottonwood
21. Birch
22. Douglas-fir cone
23. Dogwood
24. Sapsucker damage
25. Willow
26. Cascara
27. Huckleberry
28. Hemlock seedling
29. Douglas-fir seedling
30. Salmon berry
31. Bracken
32. Cedar Shake
33. Age of tree disc
34. True fir
35. Mistletoe
36. Heron's egg
37. Douglas-fir foliage
38. Hemlock foliage
39. Cedar foliage
40. Hemlock cone

APPENDIX E

Samples of Student Work

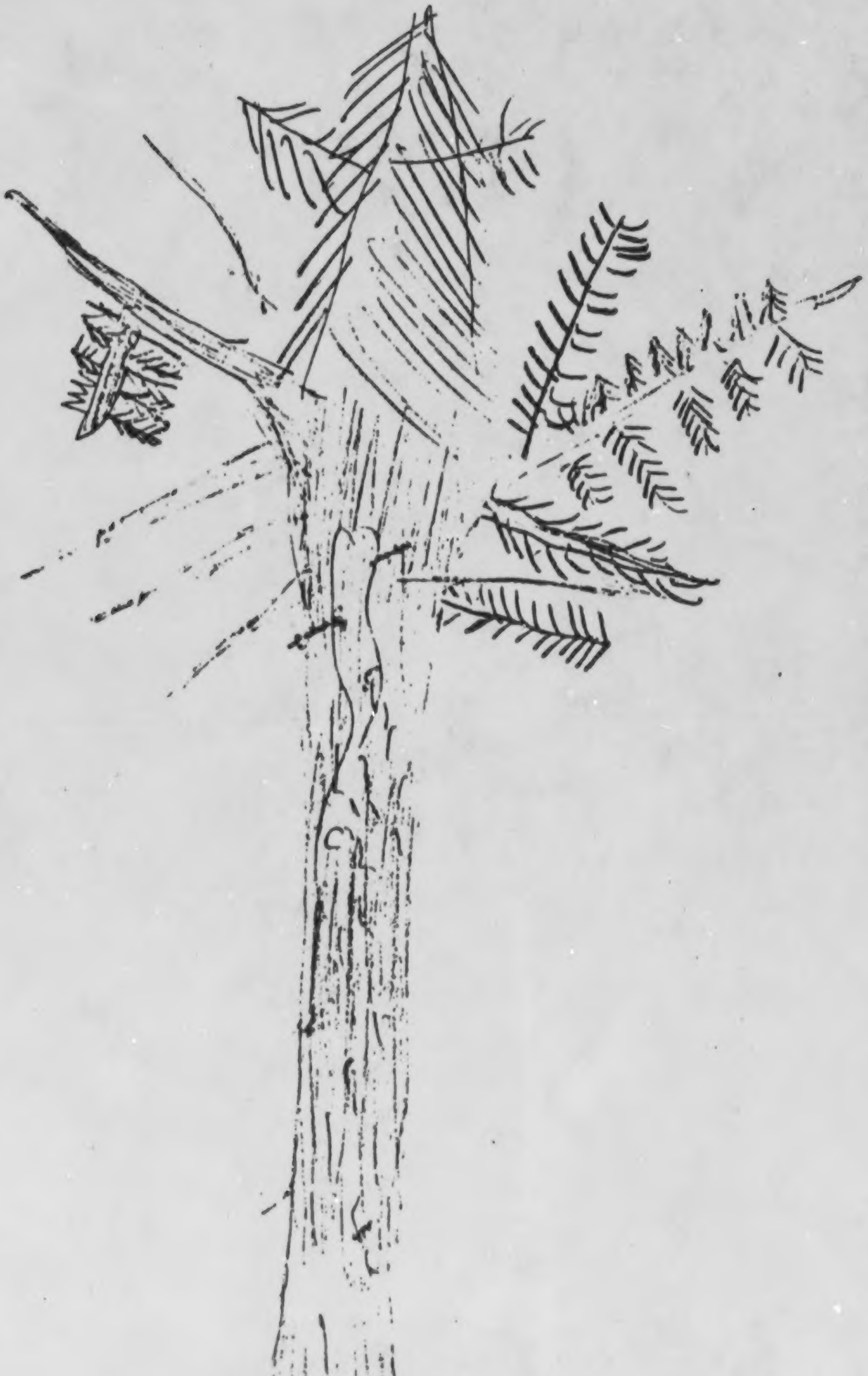


Gurtrude↑

Birginny
Robyn

Brad
George

Christine and
Wilber Hemlock



June 8

"Story-essay"

Lisa

I am going to tell you all about my life. My name is Ima. When I was just a little tree some boys came to the [illegible] was not a park then. They were running around one of the boys fell on me I was lucky I did not break and die. My brother was a few feet away from me his name is Donald. I am older than him.

One night about when I was 17 there was a huge storm. Some of my friends blew down. Donald didn't he stayed up.

When I was 23 they built a park there I was almost chopped down. I love to live in the park. But at first it was hard at first listening to kids yelling and screaming but now I am used to it.

One time some teenagers came into the park. They were sitting there then they all started smoking. One of the teenagrs said why don't we burn a tree down. They started walking towards me. Then an adault came. They took off. I was lucky.

Last Monday a class of kids came to the park. They came for something I do not know what. They were studying us. The girl that was studying me was Lisa I herd everyone call her that. There was a little girl studying my brother. Before they left every tree that got picked to be studied got hugged. I am a hemlock I am also 60 years old.

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80-06-18

Story-essay

Jennie D

"Me"

One day my, mother dropped a little cone, down to the ground I tumbled. About six month later I started to grow, my mother gave me a name it was Odis Cedar Jr.

As I grew the weather was always hot in the summer and really cold in the winter. I didn't like the winters because the snow would pile up on my branches & they would break, but as I grew older my branches grew down so the snow would not break my branches.

When I was about ninety-two a crow built a nest on me, I didn't like it to much if it went tird on my branches, it was awful. One day a chipmunck ran up under my branch and tickled me. so hard I could not stop laughing.

On my 156th birthdy the crow had brokin its wing, it sat in the tree next to me and sat and sat and sat for almost two hours, but then suddenly three stange creatures walked into the brush and one looked at me and said "This ones mine" the rest went on further. One of them seen the crow and the was scared by one of the creatures and fell out of the tree one other one chased it around the bushes and caught it and took it someplace. And that was the last day I ever saw that poor old little crow.

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Story-essay

June [illegible]

Ivan

When I was just a small cedar about two and a half inches tall, Port Coquitlam was a small town till the gold was discovered. Yes gold. In one day 1000 people came, and 50 ounces was found in a day. The creek you ask. It was called Hyde Creek. The creek was coming from a lake. The lake was called Coquitlam Lake. Some men hiked up the creek hoping to find big nuggets and some men even went up to the lake.

One day there was a bad storm. It was raining real real hard. The men were worried that the the gold would be washed downstream. After the storm the people went to the creek. They couldn't believe what they saw. They saw huge nuggets, bigger than before. The people that were farming built dikes so that if the creek flooded their crops wouldn't get wrecked.

Then one day the people went to the creek and they said, "Where's all the gold". They took it all out. There was 30.000 people there. By the end of the month there was 1000.

One summer a lumberjack cut me down. I was 480 years old.

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Story essay.

June 18, 1980 Jeanne

"My life as a Tree"

When I was young Port Coquitlam was very different now than it was when I was planted. First I suppose I should introduce myself, my name is Gertrude. I am a hemlock and I am twenty-six years old.

When Port Coquitlam first began or as I should say "named" there was no road. The animals there looked out for me so they wouldn't step on me. The animals were my friends. As I grew older I had tough bark and how I wish I could wiggle out of the ground and move and jump and run.

A week later I heard a loud noise, sort of like a chain saw and deep down in my heart I knew it was. The noise scared all my friends away so I had no one to talk to and no one to scratch my back. I soon found out they were making a new road. It took two years to build that road and I was only three. I was about five foot one and I had sawdust around my feet.

I thought I would be next to go but instead they decided not to cut me down and build a park around me. Boy would this be noisy. I was fifteen now and by the time they finished the park I was twenty-four. Now this year a bunch of grade five students came and picked a tree and I was one who got picked. As soon as they left one of the girls that picked me named me Gertrude (luckily) and gave me a hug good-bye. The End

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June 1, 1982 Story essay Christine

Hello, my name is willer. I am a big tree, I wasn't always big like tree, i used to be a wee little seed in the ground, until I started growing. I am at least forty years old. A tree never dies unless something might happen to it.

I have seen many things here in the park like kids coming for picnics and squirrels, chipmunks and birds.

I live in Port Coquitlam in a park on Wellington St. I am very happy to live here. On some days there has been nothing but rain here, but on other days there has been fresh air and a blue ski and sun gleaming down on all of us trees.

You could say I am tall and I have lots of branches and pine needles. The ground around me is mostly dirt but the dirt is moist.

Most of the trees around me have broken branches or some parts of them have no bark at all, and you know what caused it is that kids have peeled bark of the trees and have swung on the branches. I am sure glad no one's done that to me. Oh ya, I am a Hemlock i think. I better end this story because the kids from Irvine School is coming.

The End

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APPENDIX F

Teacher Questionnaires

PROJECT LEARNING TREE: TEACHER EVALUATION

In order to prepare a comprehensive report on the Project Learning Tree experiment which you have participated in, we would like some further information about the schools and teachers involved, and about the teachers' perceptions of the program. Please complete the following questions, and return this form in the envelope enclosed.

ABOUT YOUR SCHOOL

1. Number of students __________ 2. Number of teachers _____

3. How would you describe the area in which your students live in terms of SES, urban-suburban-rural, etc.?

____

____

4. How would you describe the location of your school in terms of the immediate surroundings (eg., inner city; subdivision; farmland; wooded area)?

____

ABOUT YOU

1. Name ____________________

2. Teaching assignment ___________________________________

3. Year of experience _____

4. Subject area(s) of greatest interest ______________________________

ABOUT THE PLT UNIT

The following lesson numbers correspond to the lessons you have completed in the PLT units; at grades 3 and 5, you will respond only for lessons 1 through 12; at grade 7, you will respond for the 14 lessons in that unit.

For your evaluation of the lesson, please circle a number between 1 and 5 using the following scale:

Poor	Fair	Satisfactory	Good	Excellent
1	2	3	4	5

For your delivery of the lesson, please indicate whether you presented the lesson as outlined in the manual, or modified in some way. If you circle 'modified', please give a brief indication in the space provided of the nature of the modification.

LESSON 1: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 2: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 3: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 4: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 5: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 6: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 7: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 8: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 9: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ______________________________

____

LESSON 10: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ____

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LESSON 11: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ____

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LESSON 12: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ____

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LESSON 13: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ____

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LESSON 14: Evaluation 1 2 3 4 5

Delivery as outlined modified

Modifications ____

____

The following questions refer to your overall perceptions of the unit. Please use the same scale as you did for individual lessons.

1. Organization of the materials
1 2 3 4 5

Comments: ____________________

____

2. Suitability for grade level
1 2 3 4 5

Comments: ____________________

____

3. Response of students 1 2 3 4 5

Comments: ____________________

____

4. Presentation of the materials
1 2 3 4 5

Comments: ____________________

____

5. Content of the lessons 1 2 3 4 5

Comments: ____________________

____

6. Practicality of the lessons
1 2 3 4 5

Comments. ____________________

____

Do you plan to use the PLT materials again? yes no

Other comments: ____________________

____

____

THANK YOU FOR YOUR HELP!

APPENDIX G

Phase I Evaluation Report

An Evaluation of
Project Learning Tree
in British Columbia

Phase I Report

Submitted by
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August 9, 1979

INTRODUCTION

In British Columbia, Project Learning Tree (PLT) is disseminated by means of workshops conducted in local educational settings by employees of the Canadian Forestry Association. During the relatively brief time (approximately two years) that these workshops have been offered, demand for them has risen, and informal indicators suggest that workshops are very popular with educators who attend them. In May of 1979, the Weyerhauser Company Foundation let a grant to the Faculty of Education at the University of British Columbia to evaluate Project Learning Tree and its effectiveness in the British Columbia setting. In initial discussions with personnel of the Canadian Forestry Association it became clear that mechanisms for feedback regarding teachers' use of PLT after attending the workshops are strictly informal. Because the extent of utilization of PLT materials and techniques was practically unknown, a decision was made to design an evaluation as two phases: Phase I for the purposes of surveying the extent of PLT usage in B.C. Schools and to assess the type of outcome evaluation which might most appropriately be used in this context; and Phase II to be the outcome evaluation of PLT, focusing on student learning of specific curriculum materials.

This document is the report of the results of Phase I. It includes summarization of results obtained from four different types of empirical inquiry: participant observation at a PLT workshop, a saturation survey (mailed) of individuals who have attended PLT workshops in British Columbia, a telephone survey designed to follow-up individuals with certain response patterns on the mail survey, and informal interviews and site visits in schools which have shown noticeable levels of activity in PLT usage. Recommendations of this phase of the evaluation are included as a final section , so the recommendations take the form of the design for the second (experimental) phase of the overall PLT evaluation in British Columbia.

A PLT WORKSHOP: PARTICIPANT OBSERVER'S REPORT[1]

The dissemination of Project Learning Tree in British Columbia occurs by means of workshops of three to four hours duration which are offered in locations throughout the province. Although participants in these workshops are primarily teachers, other school district personnel (such as administrators and resource specialists) as well as representatives of government agencies and industries are in attendance. The first activity undertaken in Phase I of the evaluation study of PLT in British Columbia was for one of the evaluation team, Dr. Robert Conry of the University of British Columbia, to attend a workshop given at in the school library of the John McGinnis Secondary School in Prince George, British Columbia. Prince George is a medium-sized city located approximately 550 air miles north of Vancouver and has an economy which is heavily dependent on forest products and related industries, including a number of large pulp mills. John McGinnis School is a pleasant and modern secondary school about 10 or 15 years old and housing approximately 700 students.

The workshop was conducted by Melissa Hadley of Canadian Forestry Association, as has been almost every PLT workshop offered in British Columbia. The workshop that I -- in the balance of this section, first person narrative reporting form will be used -- attended was held on the afternoon of May 3, 1979 about a week and a half after the PLT evaluation project was approved. Attending the workshops were 29 individuals other than Ms. Hadley, myself, the Prince George representative of the Canadian Forestry Association (who assisted in setting up the workshop), and a graduate student in science education at the University of British Columbia (who assisted in the closing of the workshop and in gathering materials that were required for its conduct). The 29 people were made up of 21 primary level teachers, three intermediate level teachers, four junior secondary teachers and one representative of the B.C. Forest Service who was stationed in Prince George. Although three representatives of local industry had indicated their desire to come to the workshop, none appeared. The workshop itself consisted of the following activities in the sequence given:

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[1] Revised, September, 1979.

-- As the workshop got underway at 4 p.m., Ms. Hadley, the workshop leader, asked that individuals introduce themselves while she distributed adhesive name badges for them to write their first names on and wear. Prior to this starting point, the leader and two others had distributed materials over several of the tables in the library. As individuals introduced themselves, they described their teaching responsibilities and why they were interested in attending the workshop. After these roundtable introductions, the leader introduced Project Learning Tree, noting its origins in United States curriculum development, and described it as a 'cafeteria', indicating that PLT -- due to its supplemental lesson design -- was analagous to meal planning where an individual can select the components that are required to compose a desired effect.

-- The first exercise in the workshop was a PLT lesson: Number 11, The "Touchy-Feely" Box, which the leader used primarily as a warm-up exercise for the group. The individuals had been asked to sit four or five at a table because they would participate as teams at some point during the workshop. The "Touchy-Feely" box exercise was conducted in pairs; the leader had prepared small paper bags and selected from the grounds of the school and nearby the items to be put into in the bags for this exercise. As one individual reached inside the bag and felt items therein without viewing them, he/she would describe the item to a 'partner' who would then draw a representation of the item with a pastel.

-- A brief survey was presented of other resource management and education-related materials and information available in British Columbia. Samples of these materials had been distributed over three tables in the library and included articles from the "Encore" program, booklets from the British Columbia Forest Service, materials from the Vancouver Environmental Education Project, a University of British Columbia curriculum endeavour -- and the leader was quite careful to differentiate between the VEEP materials and PLT and to assure participants that they were not the same materials and that they served quite distinct Purposes -- materials from the Science 513 Series, and OBIS job study cards. As each of these materials was introduced, the leader commented briefly on the particular applicability of the materials as well as describing their origins and how to obtain them.

-- The next activity, entitled 'Bark Molds' by the leader, was an extension of lesson 66, "Did You See That Dogwood Bark?" It involved taking a wedge of modelling clay outside to a small stand of trees, selecting a tree and a segment of that tree which appeared to be an interesting possibility for making a mold. Each participant pressed our modelling clay on to the tree to make a circular mold about 8 inches in diameter. As these were peeled off the tree, bits of bark and other materials stuck in the clay; the molds were then brought back inside, examined for various interesting characteristics (primarily aesthetic ones), and put on a table. During the meal break the leader and her CFA associate made plaster of paris casts of these molds, and participants were invited to take their bark-mold casts home with them to use as models for their own future use of the 'Bark Molds' exercise.

-- The next activity required us to go outdoors again for an exercise based loosely on PLT Lesson 69: Birds 'n Worms. Before the workshop began, the leader had spread some colored toothpicks in a grassy area outside the school, and 'roped' the area off with approximately 100 feet of twine. Individuals arranged themselves around the circumference of this roughly square area, and were told they should look for 'insect' species -- toothpicks of different colors being intended to represent insects of different species. Participants sought and picked up all the coloured toothpicks they could find, where the object was to return to the library, count the number of different coloured toothpicks that each individual and each team had found, to comment upon various camoflaging characteristics of colors of toothpicks (insects), and to gain insight into problems in sampling variation when estimating quantities of species in natural habitats.

-- The next event of the workshop was for the leader to describe an environmental activity which, again, was derived from Project Learning Tree lesson 69, "Birds n' Worms". This activity was labelled 'Create a Creature' and was designated as an activity that is appropriate for pairs of teams. In the activity, each team would select a 'mini-environment', then create and hide a creature in that environment, give the creature a name and describe it to members of the other team. Finally, the other team sets out to look for and identify the opposing team's creature.

-- Following the description of 'Create a Creature', participants in the workshop turned their attention to Tree Cookies, PLT Lesson 37. Tree cookies were supplied by the CFA contact person and the activities described in the PLT workbook lesson were essentially followed. Ages were estimated by counting rings, good and bad years for the tree in question were identified by examining differential ring width, and abberations in the formation of the rings were identified as branches, intrusions of foreign objects et cetera. Another activity related to Tree Cookies was tree puzzles. A segment of a log had been cut lengthwise and colour-coded by painting one end, and individuals/teams were invited to assemble these lengthwise segments into their original form. Also, one segment a cross-section of a log was given to each individual and they were to use whatever technique they could contrive in an attempt to estimate the diameter and age of the tree.

-- At this point, Project Learning Tree resource books were distributed to participants in the workshop, their structure was described in terms of the cross-referencing, indexing and lesson format characteristics. At this time, the leader also described the Canadian Forestry Association's efforts to devise local reference systems to use as supplements to Project Learning Tree materials: a bibliography, and a 'helpiography' -- a list of people and places that teachers may approach for assitance in obtaining materials or arranging field trips and other experiences for their students.

-- A meal break was next, coming approximately one and one-half hours after the workshop was begun. The meal was catered cold cuts and salads from a delicatessen. A great deal of informal animated discussion about the workshop and the leader went on during this period, while the leader worked in the library taking plaster of paris casts of the bark molds. It was clear from this that the participants were very favourably impressed with the workshop. Several of them had attended prior PLT workshops and had come to this one for the express purpose of getting another set of PLT materials.

-- The first activity after the meal was to review the use of Project Learning Tree K - 6 guide; at this time the leader pointed out certain lessons which she felt were good entry points into the PLT system as well as the fact that some of the exercises used earlier in the workshop were adapted from this guide. Again, the structural characteristics of the K - 6 guide were described and the cross-referencing system was explained.

-- The next activity was based on lesson 78(secondary guide), "The Continuing Adventures of the Truffle Tree Company." The Dr. Seuss film The Lorax , duration about 18 minutes, was shown and there followed a discussion of the utility of the film at different grade levels. A rather lengthy discussion ensued of the political volatility of the film in a location such as Prince George, and participants debated such issues as how one might deal with industrial representatives or parents who feel that The Lorax embodies a messages antithetical to the local economy. Further discussion focused on use of the film as a modeling basis for teaching ethical responsibility and rational planning for resource use. In all, the discussion of this film was characterized by moral issues such as the basic confrontation between enterprising users and those deeply concerned with their preservation of natural resources.

-- The next exercise represented a tone completely different from the discussion of The Lorax. It was labelled 'Crests' and was derived from Project Learning Tree lesson 32(secondary guide), "Participatory Democracy." The leader wrote the name of each of several different corporations and agencies concerned with resources on individual slips of paper, folded them up and distributed them to the teams seated around the tables in the library. As well, each team was given a piece of brown butcher paper measuring about 2 x 3 feet and a set of pastels, and members were given the assignment of creating a crest (or a company logo) for the corporation or agency whose name was inscribed on their slip of paper. After allowing about 20 minutes for production of these crests, each team posted theirs on the wall and all teams were instructed to guess which corporation or agency was represented in the crest, based only on the figures drawn (no words were permitted). The object of this was to extrapolate the stereotypes associated with each of the companies/agencies.

-- The final exercise in the workshop was a variant of PLT lesson 65: The Web of Life. In this exercise a ball of string was tossed from one individual to another one who had thought of a living thing in the forest that bore some functional relationship to the living thing mentioned by the previous person. For example, one individual would say 'tree', the next individual would say 'beaver', the next individual might say 'fish', and so on. As an individual thought of a living thing, the remainder of the ball of string was tossed to her. This continued until each person was holding on to the string at one point and participants were connected by the string. At this point, the individual (the leader) playing the role of the tree, pulled on the string to demonstrate the spread of influence of a single tree in an ecosystem. Also, one seemingly insignificant living element dropped out by means of letting go of the string. For example, a person representing a mouse would drop the string and the (symbolic) impact on the adjustment of the entire system was observed. This exercise was positioned last, apparently in order to end the workshop with an activity involving all the participants at once. It was successful in that regard.

-- Participants were urged to fill out rating sheets on the workshop and their impressions of it -- see Appendix A for a copy of this sheet as well as a copy of the teachers' newsletter that was used to advertise this workshop in Prince George -- and individuals were reminded to pick up their cast of bark molds as they left.

Some Reactions

As indicated, reactions of individual participants -- as they were expressed over dinner -- were overwhelmingly positive. As well, my reactions were substantially positive, for I felt that the workshop was extremely effective and as engaging as any I have ever attended. It should be noted here that the dynamic energy and personality of the leader were certainly instrumental in generating positive reactions to this particular workshop. It is inferred from perusing the thousands of workshop evaluation sheets in the CFA files that the workshop described here was not atypical in this regard. The workshop leader is highly regarded both personally and professionally.

As well, the PLT materials themselves are clearly very popular. The cross-referencing, the care with which lessons are sequenced and explicated and the professionalism with which the PLT materials are packaged are all clearly appreciated by teachers at workshops and by those using PLT in the field.

Emphasis in this and presumably other workshops is definitely upon Project Learning Tree as supplemental materials. The 'self-contained' aspect of the lessons is repeatedly emphasized, as is the fact that PLT lessons can be made to fit into various instructional contexts. This characterization of the workshop has some implications for an evaluation of the PLT materials in British Columbia in a field educational setting. This was verified in an interview with the workshop leader, Melissa Hadley, immediately following the workshop. She confirmed that the workshop evaluation sheets were the last point of contact with participants in the workshops other than an occasional newsletter that is mailed out to all those individuals who completed workshop evaluation forms. Although the workshops are effective -- as workshop experiences go -- it is clear that the subsequent use of PLT cannot be gauged by reference only to the sheets completed by participants evaluating workshops.

Except for the single occasion of the discussion of the movie _The Lorax_ drifting away from inferred goals of the workshop, I judged the four hour session to be effective and persuasive in influencing teachers to use both Project Learning Tree profitably in their classrooms.

SITE VISITS TO SCHOOLS/DISTRICTS

In perusing the evaluation sheets from the workshops in the CFA files, several likely sites were selected on the basis of the number of people who had been in workshops from any one location, the positiveness of the reaction of those individuals to the workshop as recorded on the sheet, and finally, the accessibility of the location. Of these sites, two were selected for visits by a member of the evaluation team, R. Conry. Two others were contacted by telephone to determine the likelihood of such locations being field research sites for Phase II. The sites personally visited were the Victoria School District on Vancouver Island, and the School District of North Vancouver, a suburb immediately north of Vancouver. The districts contacted by telephone were the Prince George district and the Surrey school district. Prince George, as the reader will recall, is 550 airmiles north of Vancouver; Surrey is a suburb situated approximately 20 miles to the east of downtown Vancouver.

The approach taken to these visits was the open-ended interview: teachers, building administrators, and district administrators and resource personnel -- for example, outdoor education coordinators -- were approached, and with each person the possibility of conducting a PLT experiment was explored. As well, the evaluator watched for evidence of usage of PLT materials in the schools. Reactions in these interviews substantiated those obtained in the mail and telephone surveys and those gathered informally while attending the workshop as a participant-observer. The teachers are very positive regarding the materials and the workshops, even in distant retrospect, but their use of PLT materials is occasional: that is, PLT is used to augment other instructional plans. In the districts visited and those telephoned it was clear that a serious curriculum experiment would be inappropriate without further intervention, because the normal saturation of usage of PLT materials would not support such a study. However, every individual contacted in these visits was amenable to the idea of further and more intensive investigation of PLT curriculum materials. This was true at all three levels of personnel: teachers, building administrators and district level personnel.

These individuals enumerated several conditions that would be appropriate to the conduct of such a study. These were not presented as formal conditions, of course, since the notion of conducting an experiment was not intially being presented as a formal proposal. But these conditions were stated as 'concerns' by various individuals at all levels of the professional hierarchy. First, it seems necessary that appropriate curriculum development activities be completed so that teachers do not have to accomplish the integrative developmental aspect of assembling PLT lessons under the pressures of their day-to-day teaching responsibilities. Other teaching materials are packaged as integrated units, and individuals seemed to feel that a fair experiment could be conducted only if such lesson-integration had been accomplished befor the experiment began. Second, there was a concern that all curriculum materials be supplied to teachers. Third, appropriate training and feedback should be provided to teachers involved. Fourth, the technical and logistic aspects of the experiment should be the responsibility of someone outside the school system itself.

In summary, the teachers, administrators and resource persons contacted on school site visits and through open-ended telephone interviews are very much open to the idea of a Project Learning Tree experiment in selected schools and districts in British Columbia. Furthermore, these people are positive regarding their cooperation and the professional contribution they can make to such an experiment. It would seem timely to capitalize upon this opportunity to conduct an experiment relatively unobstructed by either the red tape of hierarchical approval or the stable inertia which often results from disinterest.

SURVEYS OF PLT USERS

As was earlier indicated, two surveys were conducted: a mail survey and a follow-up telephone survey. To obtain names of workshop participants and their addresses, the evaluation team secured the permission of Canadian Forestry Association to retrieve this information from their files. It is the practice in CFA workshops to distribute a brief evaluation sheet to the participants. The individual participant supplies, among other information, his/her name and address. These names and addresses have been used to build a circulation list for the British Columbia PLT newsletter. Workshops in British Columbia started in October, 1977. Between that time and May 1, 1979, 94 workshops were presented and names and addresses are on file for 1,957 participants. These workshops are given predominantly in schools and at the invitation of the school or a group of teachers for the CFA workshop leader to present a workshop in that location. Besides this modal format, some workshops are also presented in forestry camps, and several others in universities. A decision was made to distribute a saturation survey to all individuals except for student teachers who had attended workshops at universities. This led to the distribution of 1,504 questionnaires to teachers, administrators, employees of industries who attended workshops in schools or at camps. Furthermore a 50% sample of student teachers was drawn, and 226 questionnaires distributed to that group, yielding a total of 1,730 questionnaires mailed to workshop participants. It had been anticipated that student teachers, in particular, would be very mobile, and this was borne out: a large proportion mailed to student teachers were returned as undeliverable. It had not been anticipated that a high proportion of questionnaires mailed to other participants would also be returned as undeliverable; in all 127 (7.3% of the total) questionnaires were returned without having been opened.

Some of the questions on the mail questionnaire were designed to elicit information that would indicate the degree to which individual respondents were interested in participating in the Phase II activities of the B.C. PLT evaluation. Individuals who indicated a comparatively strong interest in participating in a curriculum experiment were contacted by telephone for the purpose of completing a follow-up survey. This telephone survey focused upon the problem of locating individuals, schools, and districts which would be interested in and prepared to cooperate with the conduct of a field experiment. Results of the two surveys are presented in this section.

The Mail Survey

A copy of the questionnaire used in the saturation survey of PLT workshop participants -- and the accompanying cover letter -- is attached to this report as Appendix B. The questionnaire was designed in three major sections. The first, 'About You', elicited biodemographic information from the respondent, including name, school address, workshop location and date, category of employment, and -- in the case of classroom teachers -- the grades, subject, and tenure of their teaching. The second section, 'About PLT', was designed to elicit evaluative responses regarding PLT materials and the workshop the individual attended as well as information about the frequency and type of their PLT usage subsequent to the workshop. The third section, 'About Us', had the dual purpose of informing respondents that there is the possibility of conducting a field experiment to evaluate Project Learning Tree as instructional materials and of allowing the respondent to indicate the degree to which s/he was interested in participating.

Table 1 presents information bearing upon the return rates of questionnaires mailed. Of 1,730 questionnaires only 209 were returned within 6 weeks, yielding a usable return rate of 12.1%. The questionnaires returned as 'undeliverable' comprised 7.3% of the mailout.

Table 2 summarizes the returns by location of residence of the respondents' school addresses. These returns are grouped into educational regions of British Columbia which are delimited on a map found attached to this report as Appendix C. Naturally, the largest proportion of returns come from Greater Vancouver, which is the region of work for 24% of the 175 individuals who completed this portion of the questionnaire other regions of comparatively high proportion in the returns are Vancouver Island (15.4%), the Okanagan (11.4%), and Mainline-Cariboo (10.3%).

Table 3 summarizes returns by the region and calendar year in which the workshop was conducted. The number of questionnaires mailed to each of these regions is also indicated, and it is therefore possible to calculate a return rate for each region and for each year's workshops. As indicated, some regions exhibit a comparatively higher return rate -- and presumably a corresponding higher interest in PLT and research activities related to it -- though the overall return rate is disappointingly low. (This is due in large part to the time of year -- the last three weeks of the school year -- in which it was necessary to mail the questionnaire.) Predictably, the return rate for more recent workshops is higher than for more temporally distant workshops. This is affected both by mobility rates and by general dissipation of interest as the workshop recedes in the memories of participants.

In Table 4 is summarized the distribution of respondents according to their current job descriptions, queried in the 'About You' section of the questionnaire. As anticipated, by far the largest category of respondents is 'classroom teacher'. A related variable, length of teaching experience, is reported in Table 5. It may be seen that the most common experience interval is 6 - 10 years, but the respondents were widely distributed over the scale of experience from 0 to 38 years, with the median value being 9 years.

Table 6 indicates the current grade-level teaching responsibilities of respondents. More than 85% of respondents to this questionnaire teach at or below grade 7; 5% of these respondents teach at a senior secondary level. This would seem to indicate that the greatest level of interest in PLT is at the primary, intermediate and--perhaps--junior high school levels. This was confirmed in the interview of Ms. Hadley, who informed the evaluation team that requests for workshops from secondary teachers are rare.

The related variable of subject matter teaching responsibility is summarized and reported in Table 7. Nearly 80% of the respondents taught more than two subjects; this indicates merely that most of the respondents were elementary teachers responsible for a wide range of subject matter activities in their daily teaching duties. Science is the most common subject area taught by respondents indicating responsibility for only one or two subjects. Over 90% of respondents to this question are accounted for by 'science teacher' and teachers who teach more than two subjects.

Table 8 summarizes the respondents' evaluations of materials and workshops. Inspection of this table makes it obvious that those who attended these workshops (and returned their questionnaires) were overwhelmingly positive in their evaluations of both the materials and the workshops. Except for the single topic of the content of the workshop, not more than 3% of comments were negative. Even the most negative of the categories -- workshop content -- is 83.7% positive reaction, and 8.6% neutral.

Table 9 presents the distribution of responses reflecting the use of PLT subsequent to the workshops. More than half have used the materials as reference materials and/or shared them with other teachers, and/or used the materials directly in classroom instruction. Nearly half have passed materials on to others, and of those who have not used the materials, 95% would like to. This indicates that PLT materials see fairly active but informal and irregular usage after the workshop is over.

Table 10 includes information relating to one of the central purposes for conducting Phase I of the B.C. PLT evaluation. Only seven individuals of all questionnaire respondents have ever used the entire PLT book as a course in their regular classroom instruction. By far the greatest usage of PLT has been in the adaptation of materials to other instructional sequences, and as a resource from which single intact lessons may be selected to augment other components of the teacher's 'regular' classroom instruction.

Tables 11 and 12 summarize responses to the open-ended question requesting participants to describe the instructional contexts -- in terms of grade level and subject matter area -- in which they use PLT. From Table 11 it seems clear that by far the greatest amount of usage of PLT is grade 7 and below: 92.9% of the total. Only a fraction of 1% of usage described was above grade 10, and less than 6% was grades 8 through 10. Results reported in Table 12 suggest that PLT is seen to be appropriate for use in a wide array of subject matters: although the major usage is in science, substantial use is also seen in the areas of outdoor education, social studies, and language arts. A quarter of the materials indicated that they had used the respondents in more than two subject matter areas.

In the next question, respondents were asked to indicate the particular PLT lessons they had used and to evaluate each of the lessons so listed. Of the sixty-nine respondents who took the opportunity to identify individual lessons, 40% had implemented Lesson 01: Adopt-A-tree. Other popular lessons were 37: Tree Cookies, 09: Leaf Print, and 02: Sounds in City and Forest. Table 13 also provides the mean rating on a four-point scale for each of the 14 lessons enumerated by at least seven

(10%) of the respondents to this question. Using this scale, Lesson 17: Plant Personification was the most highly rated, with Lesson 11: The "Touchy-Feely" Box, and Lesson 37: Tree Cookies, being tied for second in the ratings. It should be noted that all lessons recieved high ratings -- some place between 'good' and 'great'. The lowest rated of the lessons listed here was Lesson 10: Tree Shapes, Natural and Unnatural, with a rating of 3.0.

Table 14 reports responses to the 7-point scale which was used to solicit participants' interest in being involved in a field experiment on PLT.(See p.4 of the questionnaire in Appendix B.) a total of 83 of the 207 respondents -- an equivalent of 40.1% - circled scales points 5, 6, or 7 on this item, indicating that there exists in B.C. the necessary critical mass of professionals for conducting a field experiment. In connection with this same question, another was asked: 'What conditions would be necessary for you to be involved?' Seventy-three individuals responded to this question, and the two most common categories of conditions listed were that it would have to be possible to accomodate the research in the individual's professional assignment for the coming year, and that somehow the time required for teachers' involvement could be arranged with the teacher and/or their administrative seniors. The next most common condition was that assistance could be provided in the form of resources or professional training, and that the district administration would approve of their participation. A few individuals listed several conditions for this question. Seven individuals indicated that there would be no conditions to their participation and a small number (5) had other conditions.

As well as the conditions necessary to be involved, the participants were asked to indicate the capacity in which they would like to be involved. 52.6% of the 78 respondents to this question suggested that they would like to be the teacher of an experimental class. The second most frequent response -- 14.1% of the 78 cases -- said that they would be prepared to do anything that was helpful, while fewer numbers of individuals suggested they would like to be involved as a resource person, in test development, in organizing the project within a local district and recruiting other teachers to be involved in the experiment, and finally to be a teacher of a control group class. To determine likely locations for the conduct of a field evaluation of PLT materials, the degree of interest indicated on the last page of the questionnaire was cross-tabulated with (1) the location, and (2) the grade level of the respondent. These results are presented in Table 15. In the case of location it seems clear that pockets of strong interest are in the Greater Vancouver region -- especially in the east suburbs of Vancouver -- and on Vancouver Island. In the case of grade level, it is furthermore clear that such an experiment could most readily be conducted in the K to 7 grade range.

The final question on page 4 of the questionnaire asked whether the evaluation team could telephone to explore the possibilities of research: 50.2% of the 207 respondents said 'yes', and 49.8% either said 'no' or failed to provide a phone number.

TELEPHONE SURVEY

Any individual who indicated a level of interest in being involved in follow-up research by circling a number of 6 or 7, who were willing to be telephoned regarding further possibilities, and who provided their telephone number were contacted in a telephone survey shortly after the returns arrived from the mail survey. (a copy of the schedule which was used for the telephone survey is provided in Appendix D.) in the telephone survey, the respondents were asked for further clarification of the nature and timing of their participation in the follow-up experiment. Table 16 suggests that it is likely that several teachers could be recruited to participate in a workshop to develop instructional units on PLT in the classroom before the end of August, 1979. Furthermore, there are 31 individuals who would be prepared to teach experimental classes in the Fall, there are 26 who would be prepared to review materials, and 24 who would be prepared to help in test development. Several individuals knew of others in their school or region willing to participate as either experimental classroom teachers or control classroom teachers. Of the 32 individuals contacted by telephone, more than half (18) suggested that they would be available in late August to participate in unit development and/or planning for an experiment in the fall term.

RECOMMENDATIONS AND PROPOSED DESIGN FOR PHASE II

From the foregoing evidence it is clear that in British Columbia, Project Learning Tree is characterized by strong interest in and approval of PLT materials, but also by informal and supplemental use of these same materials as they chance to fit in with other instructional plans held by teachers. It is also clear that there are no naturally occurring groups of students who are exposed systematically and rigorously to sequences of PLT lessons. This would seem to obviate the option of recruiting the teachers and administrators of existing groups of students to participate in an assessment of the outciomes of an ongoing program.

Recommendations

It is the opinion and the recommendations of the evaluation team that:

1. Project Learning Tree can and should be systematically evaluated in British Columbia by means of a carefully designed, 'Tylerian' mode field curriculum experiment. The two major research and development aspects of such an experiment are reflected in the following two recommendations.

2. Instructional units should be prepared, integrating Project Learning Tree lessons and support materials into a six week (approximate) instructional period.

3. Criterion referenced tests should be designed, pilot tested, revised and used to assess student learning in the instructional units resulting from the implementation of recommendation 2. As well, scales tapping appropriate dimensions of attitude should be designed, pilot tested, revised and used to assess the impact on student attitudes these PLT materials.

The conditions are ripe for the conduct of such an experiment in British Columbia at this time: there has been extensive prior distribution of materials, and the materials are well-known; the teachers and administrators are receptive --

even eager -- to participate in such a study. Also, the issues implicit in PLT are currently topical in British Columbia, a province very deeply concerned with management and preservation of natural resources. The optimal start date for such an experiment, to be conducted as Phase II of this program of studies, is August 27, 1979. The field experiment would transpire in October and November of 1979, and a final report would be submitted to appropriate parties by the end of January, 1980.

Design of Phase II

The design for Phase II is depicted in Figure I. The design can be characterized as a non-equivalent control group design, since it seems unlikely that the researchers will be given the discretion to assign students at random to experimental or comparison groups. Control groups will be within-school cohort classrooms of the same grade as experimental classes. Where possible, intact classrooms will be assigned at random to experimental or comparison group conditions. This may be impracticable given the procedures being followed to recruit individual teachers to participate in the study as experimental class teachers.

It is intended that the experiment will be conducted at three different grade levels: grade 3, grade 5, and grade 7. It is conceivable, though, that logistics may dictate that only two grade levels can be used. The second factor in this design is location. We have confirmed that there are at least two prime areas in British Columbia which could be used for conducting an experiment. They are prime both in the sense that they are eager to cooperate and encompass many teachers who have been exposed to PLT workshops and who have taken the initiative to use PLT materials extensively themselves; and they are not located at great distances from Vancouver, permitting travel and other management costs of the experiment to be kept at reasonable figures. The proposed design suggests that whole schools would cooperate in the experiment: two schools for each grade level in each location. PLT and comparison classrooms would be contained within the same school, running a mild risk of experimental contamination of control group posttreatment test performance. Since it is anticipated that control groups will not be taught by a 'competitive program' -- competitive in the sense that control group materials would have the same instructional objectives as the PLT experimental units -- contamination would probably be restricted to the teacher level and would not affect individual student scores. Measurements implied by the design suggest that pretreatment tests would be administered as well as posttreatment tests. Since there would be no intent to measure gain scores or growth in this study, the purpose of the pretreatment tests is to establish whether experimental and control groups are equivalent, and to provide the basis for covariance statistical controls should they prove not to be equivalent.

It is anticipated that pretreatment measures will include:

a. A measure of general academic ability (or an efficient proxy for this important construct),

b. A test of specific knowledge on the issues of conservation and resource management (such tests have been described in the general research literature, and we here assume their availability for these purposes), and

c. Measures of attitude to ecology, conservation, resource management, et cetera to be constructed as tailored attitude measurements after the instructional units are designed.

Posttreatment measures to be administered in control and experimental classrooms would include:

a. A criterion referenced test(s) covering materials taught in the PLT units and related concepts, and

b. A parallel form of the pretreatment attitude measure which would have been constructed and pilot tested at the same time as the pretreatment measure.

To implement this design, of course, it would first be necessary to construct the curriculum units which would support PLT instruction over a six week period. To do this, it is felt that a minimum three-day intensive workshop would be required involving teachers well-experienced in the use of PLT. The plan for these workshops is that three teachers would be recruited and given the responsibility for designing the instructional units for a grade level, with assistance from the research staff and other resource persons. Thus three teachers would be involved for three days at each of three grade levels. Costs of these 27 teacher-days are reflected in the attached budget. Materials resulting from these unit design workshops would be edited and revised by a graphic and instructional design artist, copied in sufficient number to be distributed to participating teachers and -- after the experiment -- to other interested parties. The unit design workshop teachers would also have the responsibility of identifying and delimiting the required supplemental materials which are often referred to explicitly or implicitly in PLT lessons. One session in the unit design workshops would be given to determining the parameters of the criterion-referenced tests which would be developed subsequently according to tables of specifications elaborated in these design workshops. Finally, an outline for a 'teacher-log' would be developed by the unit design teachers, so that participating experimental teachers might describe as accurately as possible their individual use in terms of time and sequencing of PLT materials.

The experiment itself is expected to run from mid-October to the end of November of 1979. This would be a six-week instructional period starting at conventional times in the B.C. Schools. In grade 3 these six weeks would likely include 12 'on-task' classroom hours for each student involved. In grade 5 and in grade 7 this figure is more likely to be about 18 hours.

The month of September and the first two weeks of October would be given to test development activities, careful preparation of materials and training of experiment personnel. Criterion-referenced tests would be pilot tested in groups of students being taught in a trial implementation of the new PLT units, probably by teachers who were involved in the unit design workshops. Such pilot tests would have the advantage of providing feedback on the units themselves, so that the units might have a final editing before being sent into the field for the six week experiment. But the main purpose of this pilot test would be to provide data for item analysis and revision of the tests to ensure that the psychometric functions of the tests are of sufficient quality to enable their use as a criterion measre in a field experiment.

Training for teachers to be involved would amount to a half day each for the experimental unit PLT teachers. For this purpose it would be necessary to acquire substitute teachers to cover the duties of experimental group teachers while the half-day training workshops were being conducted. Control group teachers would need to be trained only to administer the tests; it is anticipated that 30 to 60 minutes in the cooperating schools would be sufficient for this purpose, and substitutes would not be required. Another half-day would be needed to debrief each of the experimental group teachers at the end of the experiment. It is anticipated that this would be done after a first level (descriptive) analysis of data from the student testing had been completed.

Data resulting from Phase II of the British Columbia PLT evaluation would include pre- and posttreatment measures on experimental and control classroom children in two locations and at three grade levels, assuring substantial generalizability for any inferences subsequently drawn. Also, experimental teachers will be supplied with rather extensive on-task logs, to be completed in standard format as to allow comparability and the examination of variability in implementation of the PLT units. Finally, other 'case study' implementations of these PLT units may be conducted and reported; for example, a teacher of alienated high school students -- most of whom have learning problems as well -- has already approached us seeking permission to use the grade 7 experimental units with her high school special classes; she has also agreed to submit a report on the efficacy of these units with her special students.

Data analysis, for the experimental aspect of the study, will be a factorial, nested, analysis of covariance. Also, item-level rets will be prepared for the criterion-referenced tests, broken down by experimental and control groups; lesson-level reports -- that is, items clustered by PLT lessons within the unit -- and unit level reports will also be completed. As well, conventional item and test analyses will be conducted.

Proposed Budget for Phase II

A. Personnel		
a. Faculty coordinator (Dr. R.Conry) 0.50 unit @ $2600/unit[1,2]	1,300.00	
b. Faculty consultant (Dr. T.Rogers) 0.25 unit @ $2600/unit[1,2]	650.00	
c. Graduate research associate (S.Jeroski) 0.33 FTE x 5 mos. @ $1381/mo.[1]	2,300.00	
d. Data processer	400.00	
SUBTOTAL(A)		$ 4,650.00
B. Unit Design Workshop		
a. Teachers (3 units developed x 3 teachers/unit)		
-- Honoraria (3 days x 10 teachers @ $55/day)	1,650.00	
-- Expenses (estimated travel + per diem)	1100.00	
b. Resource persons (3 @ $75/day)	675.00	
SUBTOTAL(B)		3,425.00
C. Experimental Teachers (honoraria or substitute cost)		
a. Training (.5 x 12 days @$55/day)	330.00	
b. Debriefing (.5 x 12 days @$55/day)	330.00	
SUBTOTAL(C)		660.00
D. Materials		
a. 'Units'		
-- Secretarial	200.00	
-- Printing/binding	475.00	
-- Distribution	300.00	
b. Tests		
-- Printing	200.00	
-- Honoraria (field consultants)	450.00	
SUBTOTAL(D)		1,625.00
E. Administrative/Office		
a. Postage	150.00	
b. Telephone	300.00	
c. Computer costs	400.00	
b. Secretarial	900.00	
e. Report preparation	300.00	
SUBTOTAL(E)		2,050.00

F. Travel (estimated assuming Lower Mainland and Vancouver Island sites, 3 visits by 2 persons each location)	1,480.00	
SUBTOTAL(F)		1,480.00
TOTAL PHASE II		(Can.) $ 13,890.00

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[1] Rates established by UBC administration
[2] Based on 12 units/FTE
[3] As per exhange rate July 30, 1979

Table 1
Disposition of Mailed Questionnaires

Description	n	%
Undeliverable	127	7.3
Returned: not usable	13	0.8
Usable returns	209*	12.1
Not returned	1381	79.8
TOTAL	1730	100.0

*Two usable returns arrived too late for inclusion in data analysis.

Table 2
Returns by Current Professional Location[1]

Region	n	%
Kootenays	8	4.6
Okanagan	20	11.4
Mainline-Cariboo	18	10.3
Fraser Valley	13	7.4
Greater Vancouver	42	24.0
South Coast	12	6.9
North Coast	15	8.6
Northern Interior	6	3.4
Peace River	3	1.7
Vancouver Island	27	15.4
Universities	11	6.3
TOTAL	175	100.0

[1]As shown on map in Appendix C

Table 3

Number and Rate of Returns by Educational Region and Year of Workshop Presentation

Region	Returned	% of returns	Mailed	Return rate(%)
Kootenays	7	3.4	57	12.3
Okanagan	20	9.7	218	9.2
Mainline-Cariboo	19	9.9	84	22.6
Fraser Valley	15	7.9	75	20.0
Greater Vancouver	31	16.2	256	12.1
South Coast	7	3.4	88	8.0
North Coast	14	6.8	147	9.5
Northern Interior	10	4.8	170	5.9
Peace River	3	1.6	35	8.6
Vancouver Island	30	15.7	215	14.0
Forestry Camps	10	4.8	159	6.3
Universities	25	13.1	226	11.0
TOTAL	191	100.0	1730	100.0
Year				
1977	14	7.7	270	5.2
1978	100	54.9	931	10.7
1979	68	37.4	529	12.9
TOTAL	182	100.0	1730	100.0

Table 4

Distribution of Respondents by Current Job Description[1]

Position	%
Classroom teacher	58.1
Student teacher	7.4
Resource person	9.4
Administrator	3.9
Industry	1.0
Other	7.9
Classroom teacher/administrator	6.4
Classroom teacher/resource	5.9
TOTAL	100.0

[1] n=203

Table 5

Distribution of Respondents by Years of Teaching Experience[1]

Years experience	%	cum %
0- 2	8.7	8.7
3- 5	19.9	28.6
6-10	32.9	61.5
11-15	15.5	77.0
16-20	8.7	85.7
21-25	8.7	94.4
> 26	5.6	100.0

[1] n=161
Range: 0 to 38 yrs.
Median: 9 yrs.

Table 6

Distribution of Respondents by Grade Level Responsibilities[1]

Grade level	%	cum %
K - 3	31.4	31.4
4 - 7	43.7	75.1
K - 7	10.5	85.6
8 -10	9.2	94.8
11 -12	3.2	98.0
8 -12	2.0	100.0

[1] n=153

Table 7

Distribution of Respondents by Subject Area Teaching Responsibilities[1]

Subject	%[2]
> 2	77.0
Science	12.4
Social studies	3.4
Physical Education	3.4
Learning Assistance	2.8
Outdoor Education	1.4
Language Arts	0.7
Other	3.4

[1] n=145

[2] percent totals > 100, because two responses were coded for 16 respondents

Table 8

Distribution of Respondents' Evaluation of Materials and Workshops[1]

Category	EVALUATION % Negative	 % Neutral	 % Positive
Materials			
Content	2.1	4.7	93.3
Organization	3.1	5.3	91.5
Presentation	2.1	6.3	91.6
Workshop			
Organization	2.2	5.3	92.6
Delivery	2.2	5.3	92.6
Content	8.0	8.6	83.7

[1] n=187 to 193, over rows in this table.

Table 9

Distribution of Responses Describing General Use of PLT[1]

Response	%[2]
Shared materials with non-workshop-attenders	58.9
Used materials in classroom instruction	56.0
Passed materials on to others	43.5
Used materials as reference material	55.1
Have not used materials, but would like to	15.9
Have not used materials; not interested	3.4

[1] n=207

[2] % > 100 because more than one response permitted

Table 10

Distribution of Responses Describing Extent of Classroom Use[1]

			FREQUENCY	
Description	Never	Once	2-5	>6
As single intact lessons	58.5	8.2	26.1	7.2
Adapted the ideas	42.5	8.7	33.3	15.5
Lessons in systematic units	77.3	9.7	10.1	2.9
Entire book as "course"	95.1	1.9	1.4	1.4

[1] n=207

Table 11

Distribution of Material Usage by Grade Level[1]

Grade level	%
K - 3	33.1
4 - 7	52.2
K - 7	7.6
8 -10	5.8
11 -12	0.8
TOTAL	100.0

[1] n=118

Table 12

Distribution of Material Usage by Subject Context[1]

Subject	%[2]
> 2	24.8
Science	41.5
Outdoor ed.	31.4
Language arts	15.3
Social Studies	11.0
Other	5.9

[1] n=118

[2] % > 100, because two responses were coded for some respondents

Table 13

Frequency and Evaluation of Specific PLT Lessons Identified by at least Seven Respondents[1]

Lesson	n	Mean rating[2]
#01: Adopt-A-Tree	27	3.3
#37: Tree Cookies	18	3.7
#09: Leaf Prints	14	3.1
#02: Sounds in City & Forest	13	3.5
#08: Patterns in Nature	11	3.1
#62: The Fallen Log	10	3.5
#05: The Closer You Look	10	3.5
#11: The "Touchy-Feely" box	9	3.7
#63: Seed Dispersal	9	3.1
#06: Leaf Hunt Relay	9	3.4
#10: Tree Shapes	7	3.0
#13: Memory Circle	7	3.3
#17: Plant Personification	7	3.9
#65: Web of Life	7	3.4

[1] n=69

[2] on a four-point scale: 4=great, 3=good, 2=so-so, 1=poor.

Table 14

Distribution of Degrees of Interest in Participating in Evaluation Research[1]

Interest		%
NONE:	1[2]	42.0
	2	3.9
	3	6.8
MILD:	4	7.2
	5	15.0
	6	10.1
STRONG:	7	15.0
TOTAL		100.0

[1] n=207

[2] includes non-respondents

Table 15
Cross-Tabulation of Degree of Interest in Research Participation by Location[1] and Grade Level[2]

	DEGREE OF INTEREST[3]		
Location	None	Mild	Strong
Kootenays	4	3	1
Okanagan	8	5	7
Mainline-Cariboo	5	6	7
Fraser Valley	4	6	3
Greater Vancouver	21	8	13
South coast	8	4	--
North Coast	6	7	2
Northern Interior	1	3	2
Peace River	2	--	1
Vancouver Island	8	8	11
Universities	4	2	4
TOTAL	71	52	51
Grade			
K - 3	24	12	12
3 - 7	16	29	22
K - 7	7	5	4
8 -10	9	3	2
11-12	2	1	2
8 -12	2	1	--
TOTAL	60	51	52

[1] n=174
[2] n=163
[3] On a 7-point scale, no response/1/2 = 'none'; 3/4/5 = 'mild'; 6/7 = 'strong'.

Table 16

Tabulation of Telephone Interviews by Grade Level and Location[1]

Response	PRIMARY			INTERMEDIATE		
	LM[2]	VI[2]	Other[2]	LM	VI	Other
YES, I would like to participate in:						
a. Unit development this summer	3	3	1	9	1	2
b. An experiment in my class this fall	6	4	2	11	3	5
c. Occasional reviewing	4	3	2	10	2	5
d. Test development	3	4	2	9	2	4
YES, I know others in my school/area who would likely participate as:						
a. Experimental class teachers	1	4	2	5	2	-
b. Control class teachers	3	4	2	3	2	-
YES, I will likely be available in late August	3	3	1	8	1	2

[1] n=32 (primary = 12; intermediate = 20)

[2] LM = Greater Vancouver and Fraser Valley regions; VI = Vancouver Island; Other = outside of the Lower Mainland or Vancouver Island.